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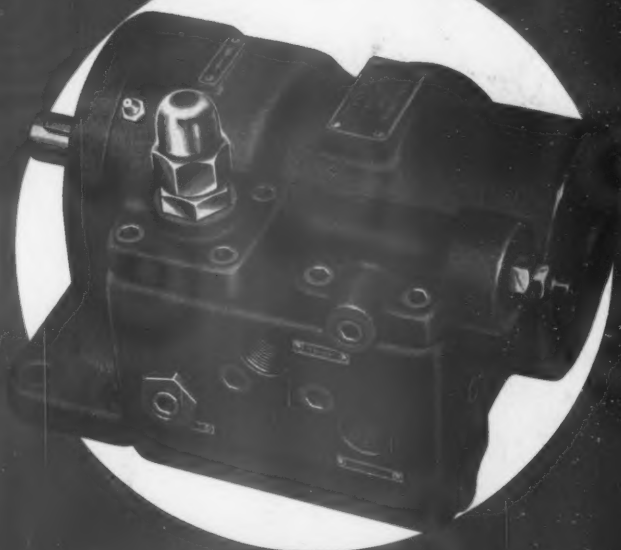
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**NOVEMBER**  
**1938**

*Official Publication of the*  
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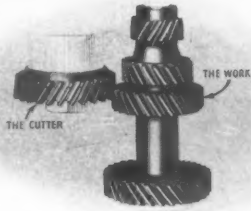
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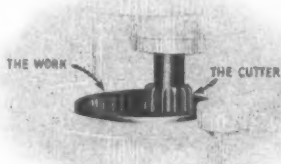
# THE GEAR SHAPER PROCESS

## is a method of WIDE APPLICATION



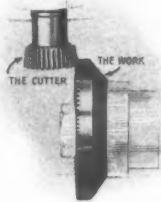
EXTERNAL

External Involute Gears, straight-sided and involute splines, and a multiplicity of other shapes can be cut up to a shoulder or into a recess, thus aiding in the obtainment of more compact designs and the lowering of costs.



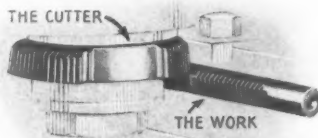
INTERNAL

Internal Involute Gears, straight-sided and involute splines, and a multiplicity of other shapes can also be cut on the Gear Shaper, so that mating external and internal members can be produced on the same machine and in some cases with the same cutter, thus assuring greater accuracy.



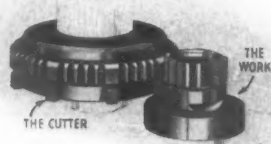
FACE

In addition to the cutting of gear teeth and other shapes on the external and internal circumference of cylinders, the Gear Shaper, when provided with a special fixture, can be adapted to the cutting of gear teeth and other shapes on the face or end of a cylinder. It can thus be employed for clutches, etc.



RACKS

Another application of the Gear Shaper is the cutting of racks. This can be accomplished by providing the machine with a special fixture. Racks with spur and helical teeth can be cut without affecting the use of the machine for the regular run of gear cutting.



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# The Tool Engineer

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Official Publication of the AMERICAN SOCIETY OF TOOL ENGINEERS

Vol. VII

NOVEMBER, 1938

No. 7

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Owing to the nature of the American Society of Tool Engineers, a technical organization, it cannot, nor can the publishers be responsible for statements appearing in this publication either as papers presented at its meetings or the discussion of such papers printed herein.

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THE TOOL ENGINEER FOR NOVEMBER, 1938





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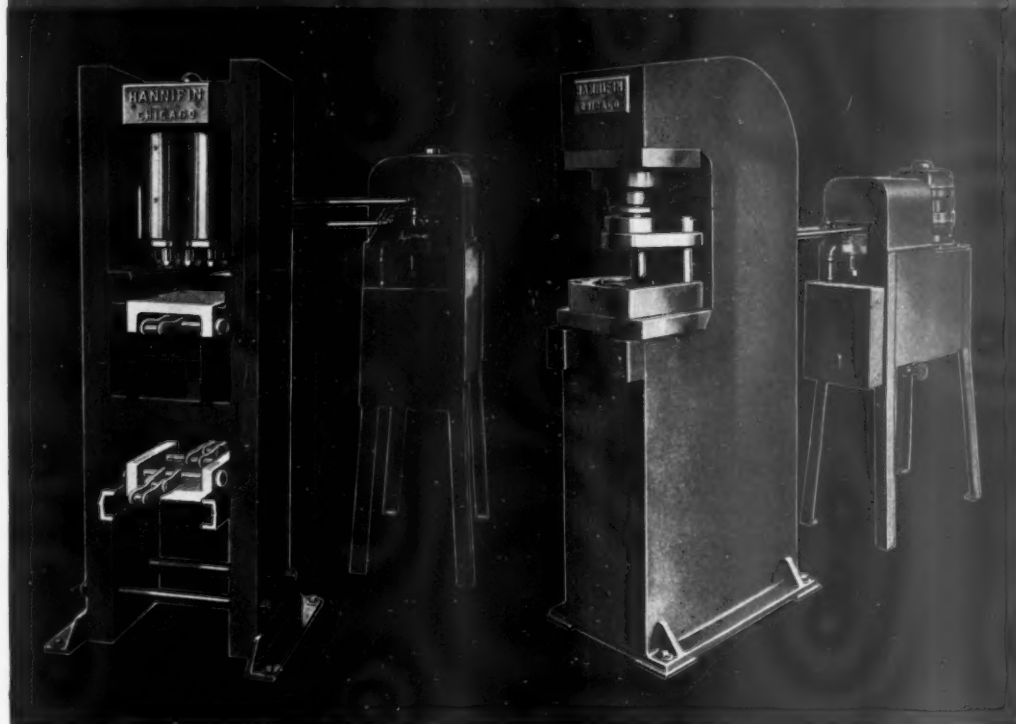
# MULTIPLE "HY-POWER" RIVETING

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ASSEMBLY OPERATIONS

Right—12 ton "Hy-Power" hydraulic riveter for application of 3 rivets in clutch spring and collar assembly. Upper cylinder operates clamping and locating fixture. Three lower cylinders head rivets simultaneously. Dual safety push-button control.

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# We Go Onward

AN EDITORIAL

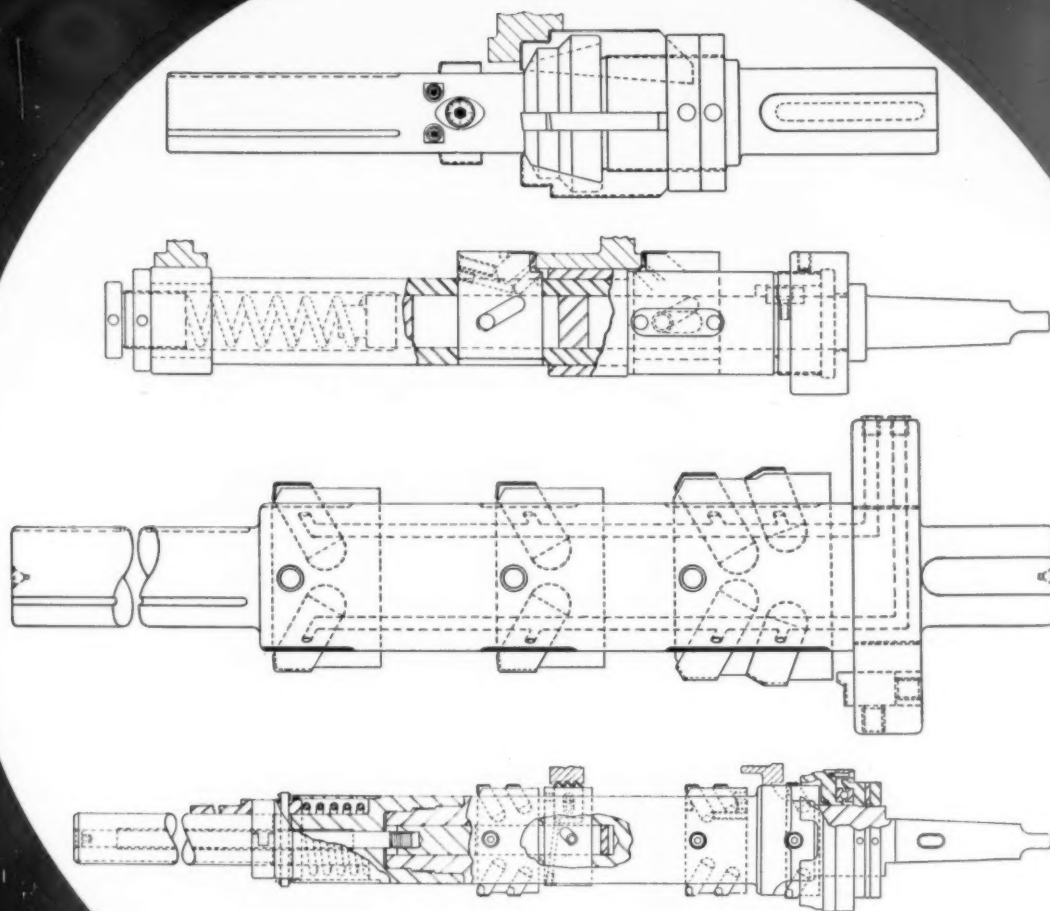
By A. E. RYLANDER

THE SPIRIT of progress that is America again asserts itself; we are definitely climbing out of the doldrums of recession. We see the trend reflected in increased building activity, in the recall of automotive workers, in the demand for steel, in a soaring stock market, the movement to recovery given impetus by a campaign to "sell prosperity and employment." We face the future with quickening hope, yet, with a prescience that an old order is past; we enter into a new era, one of prosperity to be enjoyed by the many rather than the few. Our problem is to bridge the interim between anticipation and realization; the solution rests, to a large extent, with engineers. For this era has been initiated by a minority that includes inventors, industrialists and engineers, among whom Tool Engineers have played a leading role.

These leaders, the fathers of mass production, realized long since that mass production, with its promise of mass wealth, could become either a curse or a blessing, definitely planned to insure the latter state. So product engineers slowly evolved superior automobiles and tractors, washers and ironers, vacuum cleaners and the increasing range of household appliances, inventors opened new fields to provide mass employment, the while Tool Engineers worked out methods of production that would place these conveniences at the disposal of the masses. Quantity with quality, low cost with beauty and reliability, that is the result of coordination by a majority that nevertheless gives free rein to individuality; there is no regimentation, only adherence to proven standards.

We progress, then, to a higher civilization as engineering brains create better homes, equip them with conveniences, improve transportation, bridge time and space, while industrial leaders provide better working conditions, shorten working hours and raise wages. For these higher standards, these reforms of the times were largely initiated by modern industrialists, have been in a state of progressive evolution these past twenty-five years. It had to be so; without mass prosperity—synonymous with mass purchasing power—there could be no mass production. The whole scheme, then, is cooperative, but evolutionary rather than revolutionary; we proceed on tested ground. And we, the Tool Engineers, are prime movers in the march of Progress. We go onward to bigger things.

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Photo Courtesy Westinghouse

A group of the American Society of Tool Engineers, who visited the East Pittsburgh Works of the Westinghouse Electric & Manufacturing Company

## Pittsburgh A. S. T. E. Meeting Draws Record Crowd

THE American Society of Tool Engineers Semi-Annual Meeting held in Pittsburgh, October 14 and 15, will go down in the archives of A.S.T.E. history as another milestone in the progress of this young, but virile engineering organization. The meeting was a milestone from more than one important aspect, as many very interesting attractions were offered, with the highlight of the two day sojourn, the Semi-Annual dinner breaking all attendance records. Outstanding features of the meeting were the very fine attendance and the enthusiasm with which the Tool Engineers entered into the activities, the plant excursions, and the "good time" activities—many of which were planned, and—many of which came about spontaneously as old friends and associates met.

The William Penn Hotel in downtown Pittsburgh was headquarters for the convention. Some out of town members arrived on Thursday afternoon, October 13, but the large majority arrived between six A.M. and noon, October 14. At 9:30 A.M. busses left the hotel to carry members, guests and friends to the various plants to be visited.

### Plant Tours

One of the most popular plant trips was through the Westinghouse Electric & Manufacturing Company's mammoth factory at East Pittsburgh. Arriving at this huge plant the visiting Tool Engineers were divided into groups of eight—each headed by a guide. A first impression was the tremendous size of the machinery, equipment, and the work itself. Very large generators and motors were seen in the process of manufacture. A trip through the railroad signal system department was also interesting. An unusual machining operation which caught the eye of many of the visitors was the turning of a four arm spider, 211 inches in diameter. A large shaft approximately 30 inches in diameter and some 25 feet long with a flange of some 4 feet in diameter was also being turned. One of the most interesting machine tools seen at this plant, was a mammoth lathe with a 10 foot swing. To the casual observer there was no bed to this lathe, as the ways were even with the floor. The headstock could be described as being considerably larger than a watchman's shanty at the entrance to such a mammoth plant.

This plant tour started at 10:30 A.M. and

ended at 4:30 P.M. Those who had attended expressed great satisfaction and also their appreciation for a fine luncheon which had been provided by the Westinghouse Company in the plant cafeteria.

Another plant tour which attracted many of the visiting Tool Engineers was through the mammoth \$60,000,000 rolling mill of the United States Steel Company. An unusual feature of this plant to attract the attention of the visitors was the large continuous furnace where ingots were heated up to the correct temperature for rolling. These furnaces were automatic in operation and ingots from the furnace were automatically unloaded onto the rolling conveyor carrying it to the rolling mills. The automatic features of the continuous furnace, the mass production principles involved in the continuous operations, the control of the very heavy but intricate machinery of the "line" from the "pulpit" overhead intrigued and held the interest of the Tool Engineers. The repair and maintenance department of this huge steel mill wherein rolls and other equipment were kept in condition was also of great interest. An enormous roll grinder which could handle rolls 3 to 4 feet thick and 30 feet long was one of the tools to further interest the visitors.

The Mesta Mach. Company had probably the largest machine shop that most of the visitors had ever seen. In this huge shop extremely large, heavy equipment for steel mills is built. One of the unusual features was the floor of this huge machine shop which was made up of cast iron sections with T-slots running in all directions, providing the facilities to mount the unusually large and heavy castings while they are being machined. The work is usually so large and heavy that the machines to do the machining are put on or near the work. Many of the machine tools which were seen in this plant are the largest in the country.

It was a rare treat to be shown through the Mellon Institute. The work of this institution is carried on and financed almost entirely by sustaining companies. Many of the projects in research there are being carried on by sustained fellowships, paid for by each individual company sponsoring the project. The institution offers the use of its well equipped laboratories, library, and provides inter-communication of the scientists work-

ing on the various projects. It was noted by the visiting Tool Engineers that the work in progress at present largely concerned commercial chemistry. The projects of more specific interest to the Tool Engineer dealt principally with welding rods and materials.

The Firthite Division of the Firth Sterling Steel Company at McKeesport provided a splendid opportunity for Tool Engineers to see how Firthite Tungsten Carbide is made. From the powdered form, with varying degrees of tungsten powder prepared with carbon and cobalt moulded under tremendous hydraulic pressure into blocks of required shape the hard "metal" familiar to Tool Engineers was seen to take form. These forms or blocks were then subjected to tremendous heat or a "sintering" process which further solidified or hardened the mass at the same time refining it. The welding and finish grinding and assembly of these tungsten tips into their holders was the final operation to be seen. The Firth Sterling Steel Company graciously furnished smokes and souvenirs of the trip.

The New Kensington Works of the Aluminum Company of America presented to Tool Engineers visiting its plant, methods of manufacture not often seen. In this large plant aluminum cooking utensils are fabricated and an operation which was of particular interest was the shaping of aluminum by spinning. This is the largest plant of its kind in the world.

The high point of the occasion was the Semi-Annual Dinner in the Chatter-Box Room of the William Penn Hotel. The dinner was preceded with the singing of a number of old time favorite songs and the A.S.T.E. Theme Song. After the banquet, President Walter F. Wagner introduced all national officers and national committee chairmen. A report of the condition of the national body was read by the National Treasurer and Secretary. The Treasurer's report indicated a very strong financial condition of the Society while the Secretary's report indicated the tremendous scope and activity of the Society and its chapters and the workings of the national offices.

The main speaker of the evening was Mr. J. H. Van Deventer, Editor of THE IRON AGE whose splendid address on Tools, Taxes and Wages is reprinted in abbreviated form elsewhere in this issue.

# TOOLS, TAXES and WAGES

By J. H. VAN DEVENTER  
EDITOR, THE IRON AGE

Address Before A.S.T.E. Semi-Annual Meeting, Pittsburgh, October 14, 1938

THERE is an old adage which reads:  
"Live and learn."

The best way to learn, while one lives, is to observe what men are doing, why they are doing it and how they are doing what they do. I have learned some valuable things by applying these observations to the American Society of Tool Engineers.

What is the reason for your existence? What economic demand has created, in such a short time, an organization of such size and vitality? I see gathered here tonight an audience rivaling in quality and exceeding in numbers those which our best known and oldest engineering associations and societies can summon on like occasions. I have sat down with or on occasion stood up before a number of your local chapters, noting always the same enthusiasm there which I discover in your larger get togethers.

Admitting the excellence of your officership, we must look for the larger reason elsewhere. An organization, as yours, cannot grow with such astounding tempo unless there is a need for it. And that need, while it is a need of the present may be a greater need of the future. Nature does not work from hand to mouth. The seed that is planted today becomes food that is eaten long afterward. This organization of specialized brains which is evidenced in your own society is taking place in response to a need of the future which is profound and fundamental.

You are not alone in being recruited to fill that need. On all sides I can observe a renaissance of technical and scientific organization which is prophetic of things to come. A gathering together of specialized brains and experience, as the Society for Metals, the Iron and Steel Engineers, or the American Welding Society. Specialized bodies, all of these; closely knit and hence able to marshal their forces and march forward with a rapidity impossible to more general organizations. In all of these bodies, as in yours, I detect that same spirit of vigor which portends things to come.

## War on Want—Through Production

I believe that the future is recruiting and marshalling the specialized technical forces of the present for the future battle to save civilization. Not to save it through making war on people but to save it by making war on want.

Nations go to war because they want more than they have. The world could not abolish war by abolishing Mr. Hitler. The world can abolish war by abolishing poverty and supplying wants. And the only way to do that is through production. Think that over.

We are just beginning, now, to organize effectively for production, to ap-

ply specialized knowledge and experience and skill on a scale that the world has never yet seen. During the coming decade this rapidly growing potential will generate a satisfaction of wants and needs that will heal many of the hurts of humanity. And you peace makers in the realm of production will play a mightier part in abolishing war than the peacemakers in the fields of diplomacy.

So much for the long term outlook in which you will play such an important part, but now, let me turn to the immediate outlook.

The man in the valley has a different outlook from the man on the mountain top. Outlooks, you see, differ with the mental condition and physical position of the looker-outer; this applies to economic outlooks, as well as all others. My job will be to try to give you a vision of what may be ahead of us, not from a hole in the ground nor from a mountain top, but from the medium level at which most of us live and work.

If you want to find discouraging things in the present economic outlook you won't have much trouble. Just read the newspapers. But what we see in the newspapers are usually exceptions, not the averages of the experiences of life. We read in the newspapers, for example, that five or six people have been killed in automobile accidents over the weekend; we do not read about five or six million people who have made a safe return from an enjoyable outing during the same period.

I am not criticizing the policy of the fourth estate in considering exceptions to be news; the fact is that there is not enough news-print paper available to publish anything but exceptions. My point is that in forming conclusions from these exceptions we must dilute



MR. VAN DEVENTER

them about four or five million to one, in order to get the correct non-corrosive mental solution.

One of our big jobs is to avoid the mental hazards which come to us today through our lack of a sense of proportion in appraising the meaning of what is happening all around us.

You can find plenty of these mental hazards today if you look for them. Thirteen million unemployed in America. That's headline news! But it is not headline news that 37 million Americans are still employed in gainful occupations throughout this country.

Strikes and labor disturbances and internecine warfare between labor unions. That's headline news, but it is not news that 90 per cent of the present employers and employees in America are working in harmony and with peaceful purpose.

Depression—that's headline news. But it is news that in the ebb and flow of business activity, the trough of the wave, when it appears, is the certain forerunner of a crest to follow?

Depression lows. Troughs in the sea of commerce and industry. Periods in which obsolescence, wear and tear and accumulating wants and needs of millions of people build up an irresistible swell of demand whose crest eventually will break upon the industrial shores and sands of every community in the land.

## "Silver Linings"

I am not going to climb a mountain and give you a Pollyannic view of the future from that false vantage point. But if I can show you the silver linings in some of the dark clouds which obscure our present horizon, it will not be distorting the true picture.

Start with the situation overseas. Undeclared wars and rumors of wars, treaties reduced to value of the paper on which they were written. A paper hanger from Austria turning the clock back a century and aping the antics of the first Napoleon, a Germanic people hypnotized and goose-stepping toward his goal of world domination; the great democracies of the world bowing to a self-appointed saviour of Kultur who would doubtless ravish our fields of world trade with the ruthless readiness with which he has already raped the common rights of helpless minorities.

So what?

I am sorry to say that so far as the mechanical industries of America are concerned, this jettisoning of justice improves our outlook, will stimulate the export flow of machinery and mechanical products from this country.

There is simple reasoning back of this opinion.

Hitler, without firing a shot, has won

the war that Mr. Chamberlain prevented. We must look at these things realistically and not through the face-saving camouflage of European diplomacy.

So what?

Hitler has demonstrated to the pacific democracies that might makes right; he now proposes a disarmament pact, has signed a paper. Will his neighbors take stock in that?

Neither France, nor England nor even Russia were as well prepared for war as was Germany; if they had been, do you think that they would have capitulated to Germany's demand?

And having experienced the humiliation of capitulation, will these nations leave a single stone unturned to prepare for the inevitable show-down?

Do you think that Hitler, having found that might makes right in spite of treaties, will not again become hungry? Especially since he now controls the great Skoda works?

#### Equipment Market to Expand

Again, so what? If I am not much mistaken you are going to see a demand from these countries for all sorts of production machinery, a demand that will keep our factories working overtime. It won't be a demand for guns and shells, but it will be a demand for the wherewithall to make them and to make all of the thousands of war necessities which go with them. And this armament rush will have its effect upon the businesses of every one of you because armament, from start to finish, means metals.

This revelation of the truth that might makes right among the nations of the world will also have its effect upon American armament policy. Undoubtedly, when Congress reconvenes, you will see larger appropriations made for this purpose. For we have learned that there are but two ways to prevent war: one is to be ready to surrender, the other to be ready to fight.

Now let us turn from world problems to those of our own steel industry. It remains true that steel is the best barometer of the industrial activity of our country. When steel production is good, business is good. When it is down, business is usually down, the reason a simple one that steel is the most common basic material of the diversified industries of America.

July 6, steel production in the United States was 23 per cent of capacity, today production is at the rate of 51 per cent. I hold the opinion that before October is finished we shall see a general steel rate of close to 80 per cent. That sustained increase week after week is encouraging in itself. But to my mind the most encouraging feature of this steady gain is the fact that what we call "miscellaneous uses" of steel have contributed most largely to it.

We (referring to the industrial publications in the steel field) have established a classification of steel consumption which is divided into a number of principal divisions. One comprises the steel used in the automobile industry,

another steel used in the railroad industry, still another steel used in the construction industry. Beyond these three we have classifications which take the remainder of the steel called for by the various consumers of the country.

One of these lesser divisions we call "miscellaneous or unclassified uses," a "catch pot" into which we lump all of the steel that cannot be segregated into the various definite divisions that custom has established. This is the division to watch if you wish an insight into our industrial economic outlook.

A few years ago the automobile industry was taking 25 per cent of the steel produced in the United States; the three major classifications took among them well over half of all of the steel produced. Some might think this healthy for the steel industry. I do not. I want to see the automobile industry take an increasing tonnage of steel year after year, but not an increasing percentage of the total ingot production. The reason is simple; you cannot live on your own fat. When the automobile industry takes  $\frac{1}{4}$  of all of the steel produced, enough steel is not going to industries which support the automobile industry by creating purchasing power wherewith to buy its products.

That is why I am encouraged by the steady increase in steel operations which have taken place the last few months; a large portion of it has been what we call "miscellaneous" demand.

This means that thousands of inventors and designers have been busy designing, developing and perfecting new products which require the use of steel.

#### Encouraging Signs

It is better for us that the manufacturers of miscellaneous products increase their proportionate use of steel than that the automobile industry or any of the other established industries take a larger proportion of the total. Why? Because people who make and sell such are people who also buy automobiles and other metal products. An increase in the "miscellaneous" classification means increased activity in every conceivable miscellaneous application of steel and means that there is being developed a new increment of national income, which will help to finance the purchase of more automobiles. That our national steel production rate could double itself in two months without much help from railroads or construction or even from automotive buying is, in my opinion, a decidedly encouraging forerunner of all around better business.

We need not worry about the desire of consumers to purchase automobiles, etc.; what we should consider is building purchasing power through growth of new industries and new products. The increase of unclassified demand for steel is the potent purchasing power which will make 1939 a better year than was 1938.

This increase has come without the help that we would expect, in normal years, from the railroad and construction classifications. Consider what we

may expect from these important consumers.

Take the railroads.

In normal times the great railroads were among the largest buyers of all sorts of capital goods and basic materials; for materials and labor spent a billion dollars per month. For the last ten years they have been facing an increasingly difficult problem. To make ends meet, in respect to dollars of income and outgo, they have had to make needs wait in respect to maintenance and new capital investment. Needs can wait—are patient for a while but patience has a limit.

Today, the needs of the railroads are crying for satisfaction, are saying to railroad management: "We must have new freight cars, motive power, new improvements. If you do not satisfy these needs, we both will die."

This railroad problem is crying for solution, will be solved, has come to a head with the President's appointment of a committee to study the situation and perhaps more so with the present railroad management-labor controversy on the subject of wages. Some stabilization will come in these matters, probably within the next few months. Whatever form that stabilization, it will at least clarify the outlook for railroad management which can then make plans for the future. These plans must, in self-preservation, involve considerable outlays of a capital goods nature.

In the construction field, I anticipate an expansion of activity, from the standpoint of public as private building. Much of our idle factory space is in disrepair unsuited for production purposes without rehabilitation. The slightest increase in business volume, requiring the use of additional plants will call for modernization expenditures.

Some people complain that these are hard times, for industry, for young people starting in business, for old people who have established positions and face the fear of loss; hard times for everybody.

What we call "easy times" never developed big men. America has not been developed by easy times but by competition to produce better products or greater values. That urge of competition is always accentuated by what we call hard times.

Hard times form incubation periods for new ideas. Many of them, in the political field, unfortunately seem to be ideas of how to obtain easy times by the short cut method. How to obtain more by giving less. I think that our profession sees the picture more realistically than do the politicians. To obtain progress you must work for it.

Did you ever stop to think that an engineer, no matter what his line may be, whether a Tool Engineer, chemical, metallurgical, efficiency engineer, an industrial engineer or a designer of machinery lives on difficulties and thrives on troubles? If there were no troubles we should have no engineers; we couldn't use them. If costs were low

(Continued on page 30)



# Methods and Tool Design

By  
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BLOOMFIELD, N. J.

A Paper Presented Before Central Pennsylvania  
Chapter A.S.T.E.

THE subject assigned for discussion, "Methods and Tool Design," is one of the most important functions of any manufacturing organization. To meet competition of today, it is essential that we select the most efficient methods, tools and equipment to produce our products at the lowest cost. Does this big responsibility—"Produce our products at the lowest cost"—belong to any one man or department in the organization? I think most of us will say "no." It is a joint responsibility of the entire organization, with the Planning and Tool Engineers playing leading parts.

## Planning

The term "Manufacturing Methods," as we see it, covers a broad field of activities and is considered a responsibility of the Planning and Tool Engineers. These activities consist of:

1. Engineering Planning
2. Production Control Planning
3. General Factory Planning

1. Engineering Planning involves an analysis of the requirements of the product, for the purpose of obtaining a design satisfactory not only to the engineering and sales organizations but to the manufacturing divisions as well.

2. Production Control Planning may be considered as a survey of the equipment and material available for the manufacture of all products. This also includes the establishment and follow-up of production schedules consistent with balanced labor operations.

3. General Factory Planning can be considered under two classifications:

- (a) General Planning
- (b) Job Planning

General planning involves an analysis of manufacturing requirements such as:

- Plant buildings
- Floor space requirements
- Machine tool equipment
- Departmental layouts

Job planning consists of detail analysis of specific jobs and operations.

At the beginning, or the revision of an operation, a survey of the method contemplated or in use should be made. The major factors to be considered are:

1. Purpose of the operation
2. Quality requirements
3. Equipment
4. Materials
5. Service to operator

1. Purpose of the Operation

Know the reason for and the importance of the operation. Determine how the operation aids the functioning of the part. Can the operation be elim-

inated, or combined with other operations?

- (a) By changes in design
- (b) By changes in tools and equipment

## 2. Quality Requirements

Determine from drawings and standing instructions if the quality requirements, as specified, are necessary for the proper functioning of the part by asking yourself the following questions:

- (a) Is the grade of finish necessary?
- (b) Are the tolerances closer than necessary?
- (c) Should the work be gauged or tested? (Mechanical or Electrical.) If so, how frequently?
- (d) Are testing and inspection instructions specified?

## 3. Equipment

To obtain the maximum output with the minimum investment for equipment, it is essential that the following important factors be considered:

- (a) Is the machine tool equipment contemplated or now in use the most economical?
- (b) Is the existing equipment properly maintained to assure maximum efficiency?
- (c) Do tools, jigs and fixtures, which are being planned or now in use incorporate the principles of motion time analysis?
- (d) Can conveyors be used to advantage?
- (e) Are proper material containers planned or now in use?
- (f) Is proper equipment provided to facilitate handling?
- (g) Is a proper work place provided?

## 4. Materials

Material cost is of major importance in most products. Consideration should be given to the following:

- (a) Can the specifications be changed substituting a cheaper material, either size or quality?
- (b) Is material of such a nature that it can be ordered in economical quantities and sizes?
- (c) Is the specification for material such that it will cause the minimum amount of waste and spoilage during processing?

## 5. Service to Operator

Service should be given to the operator when it will result in economies.

- (a) How should operator receive materials and tools?
- (b) Is material delivered in most convenient form for rehandling?
- (c) How is completed work removed?
- (d) Should reconditioning of tools and set-up of job be performed for operator?

- (e) Should operator clean and maintain machinery?

- (f) Are instructions for doing the job clearly stated and understood?

## Improvement of Manufacturing Methods

Considerable time and effort are applied in determining methods of manufacture. Tools, fixtures and manufacturing methods are constantly being improved.

Periodic reviews of existing methods, time studies and equipment analyses are essential in order to take advantage of the improvements which have been provided and which can be introduced to expedite more economical manufacture.

These problems can best be solved by consideration of the following:

## 1. Tools, Jigs and Fixtures

In addition to providing the most suitable tools, jigs and fixtures to do the work, it is also necessary to provide proper mechanical aids for manipulating these tools with the least amount of effort. The following is outlined as a guide for determining the proper mechanical aids:

- (a) Foot operated levers to supplement hand motions.
- (b) Mount tools on swinging brackets when possible to aid in transporting to and from the work point.
- (c) Various kinds of holding devices to free the hand so that it may proceed with constructive work.
- (d) Combining of two or more hand tools in one.
- (e) Fixtures for positioning parts to aid machining or assembly.
- (f) The use of automatic feeders or ejectors with the use of fixtures, to eliminate the necessity for removing the finished parts by hand. These are especially important in operations having short cycles.

## 2. Bench Arrangement Including Materials

- (a) Materials and tools should be arranged and prepositioned so that they may be readily grasped in the position in which they are used.
- (b) Containers should be so arranged that materials can be removed with the least amount of effort.
- (c) Placement of materials should be arranged in the order in which they are used. When two like parts can be assembled at the same time, duplicate stations should be provided, so that each hand will reach for a part at the same time.



(d) Materials and tools should be located at a height slightly above the working point, and within the normal working area.

(e) Wherever possible a "drop delivery" should be provided to dispose of the part.

### 3. Working Conditions

When arranging the work place, the comfort of the operator should always be considered. Provision for the operator to be seated should be made whenever possible; also proper lighting, heating and ventilation should be maintained.

### 4. Machine Tools

An analysis should be made to determine the most economical and effective use of new and existing machine tools, relative to speeds and feeds, proper capacity loading, and flexibility in case of breakdown.

### An Example

I am going to give you a brief summary of how we, at the Bloomfield Works of the General Electric Company, plan and follow our work from the design of the product to the tool design stage. We are, as some of you know, one of the smallest manufacturing plants of the General Electric Company, and employ approximately 1200 people. The majority of our work is of the short order or Job Shop character and we try to use standard tools and equipment wherever possible. The organization directly responsible for manufacturing our products is divided into the following departments.

1. Design Engineering and Drafting
2. Planning and Methods
3. Wage Rate
4. Tool
5. Production
6. Manufacturing
7. Test and Inspection
8. Cost and Accounting

In this order the idea is developed; methods, tools and equipment selected; operations priced; orders placed; tools designed and completed; parts made, tested and inspected, and finally costed for billing.

Each and every department has contributed toward the discharge of these responsibilities by devoting their best talents and efforts to produce our product at the lowest cost.

In giving you this summary, I am going to start out in our Design Engineering Department, where the men are discussing a new design. The ideas have been discussed and hand made sketches are being prepared. In designing a product, the Engineer must remember that to be efficient and economical the design should:

1. Meet quality requirements
2. Permit ease of manufacture
3. Permit reasonable tolerances
4. Specify the lowest cost material, preferably standard material of standard size
5. Make drawings and instruction sheets that can easily be interpreted.

Having finished his sketches, the De-

sign Engineer consults with the Planning and Methods Department and Preliminary Planning of the design has started. The Engineer has an estimate of the amount of parts to be produced over a given period of time, which is very essential in the planning of any product. He is anxious to find out how much the finished product will cost and how much the tool cost will be.

The Planning Engineer is charged with the responsibility of planning the various operations necessary to complete the part and selecting the proper tools and equipment. He has a standard sheet showing all the standard tools and fixtures available for use. Each part is carefully analyzed and changes are made to allow for the use of standard tools where practical. The operations are now planned, preliminary tool lists are made, showing various types of tools that could be used. Estimates are made of the tool cost, material and operation cost, until all parts have been completed and an estimate is made of a complete manufactured unit.

This has all been preliminary planning and is done to give all interested parties an idea of what the cost will be. During this work it is sometimes necessary to consult with the Tool Designers, Factory Supervisors, Cost Men, Time Study Men or anyone necessary to obtain the required information.

After the preliminary cost has been approved, the Design Engineer is ready to have drawings made from the sketches. He calls in the Draftsman, turns over to him the sketches and all the essential information he may have to make the standard drawings.

When the drawings are completed, a meeting is called to further analyze the parts and make arrangements for a hand made sample to be made. This group consists of the Engineer, Planner, Tool Designer, Cost Analyst, and representatives of the various manufacturing departments who will be responsible for producing the parts. Each part is reviewed for any possible changes in design, materials, tools or operations. Any changes recommended and approved are immediately corrected on the drawings and an order for a hand made sample is placed. This sample is made for testing the design and also for final planning if the design is approved.

The methods used in making the hand made sample are closely followed by the Design and Planning Engineers. This is done to check all drawings for accuracy and also to check operations that may be questionable. Here again changes are made to reduce costs.

All parts for the sample are given 100% inspection to recheck the drawings, and then are assembled. This sample is tested, tried out for performance and quality, and, if approved, a manufacturing order is given to the factory to proceed with production. The Planner, with the aid of the Committee, reviews the final drawings, and they agree on the methods, tools and equip-

ment selected to manufacture on a production basis. Orders for tools are made out, approved by the Engineer, and released to the Tool Design section. A master Planning Record is filled in by the Planner, showing:

1. Drawing and number of the part.
2. Name of the part.
3. Device in which it is used.
4. Specification, size and weight of material.
5. Latest change shown on drawing.
6. Operations necessary to produce the part.
7. Department in which operations are performed.
8. Number of machine on which work is performed.
9. Tools required to do each operation.
10. Set-up cost for each operation.
11. Direct labor cost for each operation.
12. Manufacturing time allowed to complete a given quantity.

After completing the master record, the Planner has hectograph copies made for distribution to the interested parties, who are:

Cost Department for final planned cost estimates. Each Manufacturing Department who will work on the part. Production Department for production records and placing factory orders. Wage Rate Department for estimated piece price record. Tool Design Section to assist them in designing tools for proper sequence of operations. Designing Engineer for his records and check on future designs. Planning Department which maintains the master planning file.

### The Tool Engineer

In our plant the Tool Engineer has the responsibility for designing the most efficient low cost tool that will produce a satisfactory part. He continually keeps in contact with the Engineering and Planning Departments and makes such suggestions that will lead toward this goal.

After the design of the tool has been completed, the Supervisor of the Department which is to use the tool is called in for his comments and approval, and the drawings then are ready for the tool maker.

The duties of the Planning and Tool Engineers never end at this stage. We can all realize the follow-up that is necessary to see that all planned routine work is carefully carried out. The combined efforts of the Tool Engineer, Planner and Factory Layout Man are essential in planning the proper location of machines so they may be operated with the greatest economy. The cost reduction meetings are attended daily and efforts put forth to change the methods or tools to attain a lower cost. Who, may I ask, is better qualified to study cost reduction than the men who are responsible for the tools and operations? Then we have the follow-up of spoilage and waste. I am sure there is no one more capable of keeping down our spoilage factor than the men

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# Molding from the Practical Side

**T**RUSTING that it may prove helpful to injection molders in various localities, this brief summary was gathered from experience dating back to the first injection mold to ever run suc-

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and have provisions for replacement. Every different item requires a separate and individual mold design for it. In the early stages of the process mold design was, naturally, limited due to the

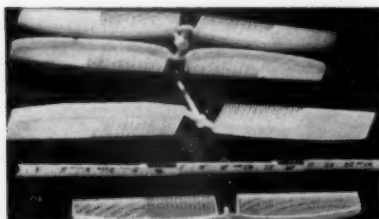


FIGURE 1

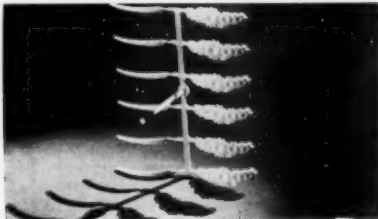


FIGURE 2

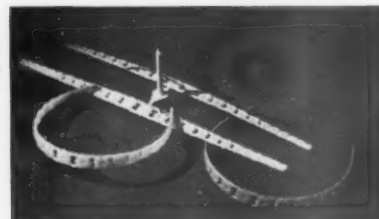


FIGURE 3

cessfully until the present date.

It is impossible to lay down a fixed set rule that will govern all types and classes of injection molds. Successful molding can only be accomplished through the cooperation of all persons concerned, that is, the manufacturer of machines, molds, and materials, as well as the molder and customer.

The first essential of molding, naturally, is the correct equipment for the job. No molder can expect to run an article or combination of articles in a mold that is over the area of the machine, even if the weight is well under the capacity. The two most important factors to be taken in consideration on equipment are fast injection speed, and absolute clamping pressure. The plunger and feed mechanism must be arranged to compensate for the variations in the granulation of material, and therefore must not be so that it is necessary to come to a fixed point before

returning. The plunger must be fast, positive, and with even speed, and yet be elastic enough to compensate for the variation. The clamping end of the machine is, naturally, the more important requirement. It should be absolute and well over the requirements of the job that is to be run. Better results would be obtained if a molder requires only small articles to use a larger machine with a smaller capacity heating cylinder, than would be the results if a light machine that is just up to the area of the molded article is used.

## Mold Design

The construction of injection molds is a very detailed and exact process that cannot be governed by any rule except past experience and the versatility of the designer. The design of the mold must be adequate for the duties which the mold is to perform, should contain a good amount of steel, all moving parts, naturally, must be hardened

small capacity of molding machines. Today, however, mold design is not limited because these molding machines can be had to suit nearly every requirement. However, regardless of this point, the mold must be designed to fit the machine into which it is to be used. The designer cannot expect to use one design for two similar molds that are to be used in entirely different machines.

The two most important points of mold design are gating and venting. It has been published in various items that the gate can be held to a certain size. This is not correct as the gating must be made in proportion to the article which it is to cast, and in consideration of the material that is to be molded. The runners leading to the gates must always have enough material and must not be choked or hampered at any point by narrow portions going between two cavities or by sharp bends. For best results, gating should be as near a straight line as possible. Figures 1 and 2 show a very good type of gating that is bound to give good results. Figure 3 shows the gating coming directly in the center of a long object. This should be avoided wherever possible, although in this particular case it could not be. The reason for avoiding this is that the gate at this point leaves a weak spot which is liable to crack and prove troublesome. In this case it was far better to have gating at the center of the item than it would have been to run it along each side of the die and come on the ends of the object. If this had been done, the material would have been chilled by the time it entered the cavity and would have produced items of poor quality and very poor finish. This mold could not be gated similar to the large comb shown in Figure 1 due to the length of the item which would have overhung the platens of the machine if it had been done so.

Constructing a mold so that part of the cavity is actually overhanging the platens of the machine is absolutely of no avail, and will give exceedingly

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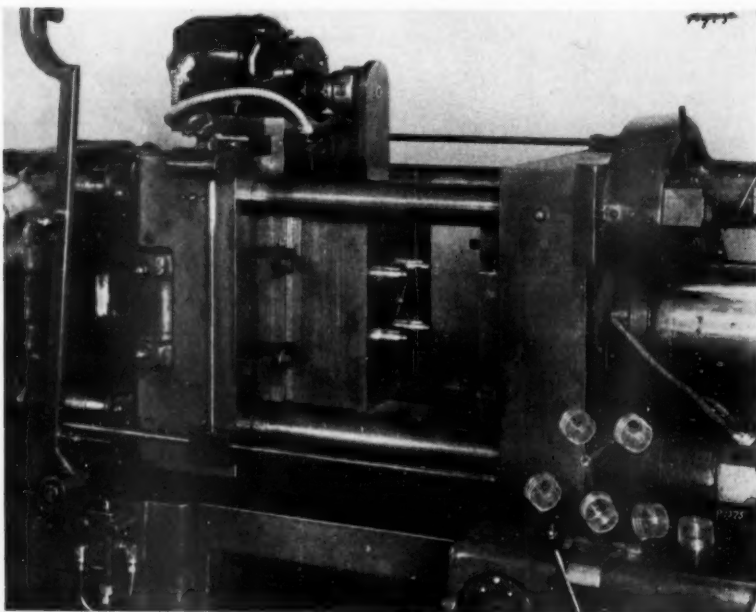


FIGURE 4

# INDUSTRIAL THREAD GAGES

By

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ENGINEER

DETROIT TAP & TOOL COMPANY

THE astonishing progress made in manufacturing methods since the World War resulting in standardization of products, interchangeability of parts, and high speed production, has been made possible by a corresponding progress in inspection methods.

Accurate gages have played an indispensable part in the standardization of products, and the rapid development in the art of measuring screw threads has called for a special study being made of this branch of industry. Progress in screw thread practice has depended to a great extent on the adoption of simplified standards, and the elimination of special sizes and pitches whenever a standard size or pitch would serve the purpose just as well.

The "American National Form" of thread has been adopted as standard throughout the United States, and it is interesting to note some of the development that led to its final acceptance as the standard thread form.

The Thread Profile is a modification of the V thread. It has an included angle of 60° and is flattened at the crest and root an amount equal to one eighth of the pitch.

A thread system known as the "United States Thread" was designed by William Sellers. This system embraced a series of pitches for certain diameters from 1/4" up to 6". The railroads of this country made use of this system during their period of development, but later modern manufacturing methods showed the need for supplementary systems with finer pitches and embracing smaller diameters. This resulted in the recommendation of the fine thread series by the Society of Automotive Engineers, and a machine screw series recommended by the American Society of Mechanical Engineers.

## Confusion and Cooperation

The confusion which existed during the World War, when the Government experienced so much difficulty in obtaining large quantities of the products of industry, showed the need for further standardization, and the securing of interchangeability of parts for replacement in case of breakage or wear.

Through the cooperation of representative trade organizations, technical societies, and Government departments, Congress was induced to appoint the National Screw Thread Commission to investigate the possibilities of developing standards for screw threads. The recommendations of the commission led to the acceptance of the United States Thread System, the S.A.E. and the A.S.M.E. systems as standard except that they were arranged in two series; namely, the National Coarse and the National Fine.

Endeavoring to establish limits for the classification of products, the commission recommended using four distinct classes of fit. These are as follows:

Class 1—intended for gaging work where a loose fit is desired for the easy assembling of parts when a certain amount of shake is of little consequence.

Class 2—intended to establish the extreme limits when a free fit is necessary for hand-assembling.

Class 3—(medium fit) used in better grades of work where play is held to a minimum.

Class 4—used in manufacture where the work must be of the highest quality. This class of fit allows very little shake or play between parts, thus introducing a factor of safety which is absolutely necessary in industries such as the aircraft industry.

An increasing demand for better workmanship in modern apparatus has made necessary a more rigid inspection to produce equipment that is free from imperfections, but the parts of which are interchangeable.

For the purpose of securing this perfection, the use of thread gages of a standard design has become the universal practice. These gages are made to one of the classes of fit previously mentioned, depending upon the quality of the product.

Usually the gages consist of a set of Limit Thread Plug Gages, made to Go and No Go sizes which represent the extreme sizes of the internal threads in the product; and also, a set of Ring Gages made to the Go and No Go sizes of the screw.

Size control of thread plug gages presents many difficulties which if not overcome can result in inaccurate final values. On this account it has been found desirable to adopt a uniform method of measuring, and the three-wire system, now in general use, has proved to be the most satisfactory. The element measured by this method is the pitch diameter. The pitch diameter is the diameter of an imaginary cylinder whose surface passes through the thread at a point where the width of the tooth is equal to the space. This makes it the ideal point of measurement because it is least affected by any variation in the angle of thread. In the three-wire system of measuring, a size of wire has been selected that will touch the sides of the thread at exactly this point. These are known as the "best size wires."

The measuring instruments for making the measurement over wires are

generally very costly machines which gage to an accuracy of .0001 of an inch, and a further estimation of values in hundred thousandths of an inch. The measurements are usually made in specially constructed rooms in which the atmosphere is controlled at a constant temperature of 68° Fahrenheit (20°C.). This is the temperature that has been officially adopted throughout the world for setting the standards of size.

Contact pressure has also to be considered when measuring screw threads; and, it has been found necessary to establish a uniform practice, because it can readily be seen, that with the wires resting on the angle of the thread and the pressure being applied on top of the wire, too much pressure would easily result in distortion. For consistency in this respect it has been agreed that for pitches of 20 threads per inch or coarser, a contact pressure of 2 1/4 to 2 1/2 pounds will be applied; and, for pitches finer than this a pressure of 14 to 16 ounces will be sufficient. The wires used for measuring must also conform to certain standards to be accepted. They must be of uniform hardness, must be perfectly round and straight, and must be made to size within a tolerance of .00002.

A Go thread plug gage should be used to check as many elements as possible; and, while its main purpose is to control the extent of the tolerance in the direction of the maximum amount of metal, it must also insure that mating parts will assemble. For this reason a Go thread gage must be made with extreme accuracy in lead and angle of thread and must be made with a full form of thread. No Go gages are designed to check the pitch diameter only, but as they control the extreme maximum size they also must be fabricated with as much care as the Go Gages.

Among the various ways of forming the threads in thread plug gages, the ground thread method is increasing in popularity. These gages are ground from the solid after the gage blank has been properly hardened. The grinding is done in specially constructed precision built lead screw machines that can produce thread forms that are well within the tolerances prescribed for even the closest fits. Due to this extreme accuracy in the lead and thread form, the thread plug gages can be safely used until they have worn to the extreme low limit, except that in the case of the No Go Gage, it is not always good economy to use it until wear has caused the gage to pass mating parts that do not assemble with the ease that the class of fit warrants.

When designing engineers are faced with the problem of choosing a class of (Continued on page 34)



# Production Perspectives

## *News of Mass Manufacturing from Everywhere*

Industrial recovery is making unmistakable progress, especially noticeable during the past thirty days. The third quarter of this year has been a period of strong business recovery and that progress is continuing as we enter the final quarter, as evidenced by the industrial production index of the Federal Reserve from 77 in June, to 91 in September. This is the greatest three month advance since 1919. Continuation of this improvement is likely for the balance of this year and prospects for the new year are very encouraging.

A considerable "back to work" movement is in evidence in many sections of the country. On October 18, Chairman Alfred P. Sloan, Jr., of the General Motors Corporation stated that his company was revising its production schedules upward and would employ about 35,000 additional men during the last two weeks of October. He also announced that salaries would be restored to the levels that existed prior to the reduction that was made last February, 28. The salary adjustment does not affect production employees, however, who were hired on an hourly wage. Mr. Sloan said the company believes the outlook for its business justified the added employment and the higher salaries. "Our new models have been well accepted," he said. "There appears to be a greater interest than existed a year ago. This is evidenced by the attendance at the showing of our new cars as well as by the number of retail orders actually received."

As this page is going to press, Mr. Edsel Ford predicted production at the Ford plant for 1939 would show 50% increase over that for 1938.

Increased activity, remindful of 1937, is taking place in Ohio automotive and related industrial plants. Dayton reported 1700 workers would be recalled to General Motors Divisions within two weeks, from October 19, with pay increases going to a total of 2000. At Warren, the Packard Electric Division of General Motors has doubled its working force in the past two months in anticipation of the upturn. Operations at the plant, employing 1400 are 70 per cent of its all time peak. Toledo Chevrolet plant ordered 100 to work, boosting its force 20 per cent with a total payroll of about 600 workers. Electric Auto-Lite, in Toledo, which has Chrysler contracts, reports nearly 100 daily increase in employment for a two weeks period with a total of 3200 working as of October 19.

From Evansville, Indiana comes word that some 2200 automobile workers went back to their jobs in two factories after settlement of a two-day strike of the United Automobile Workers of

America (C.I.O.) at the Chrysler Motor Corp. plant.

A. G. Bryant, President of Bryant Machinery and Engineering Company, Chicago, was re-elected President of the Associated Machine Tool Dealers of America at their annual convention on October 10 and 11 at Cincinnati, Ohio. John Sauer, Jr., of Peninsular Machinery Company, Detroit, will continue to serve as Vice-President, while E. P. Essley of the E. L. Essley Machinery Company, of Chicago, will again act as Secretary-Treasurer.

The Lockheed Aircraft Corp. on October 10, signed a contract with the British air ministry for the largest spare parts order ever received by the company. The contract, calling for \$3,900,000 worth of extra equipment, will complement the order received by Lockheed last June from the British Government for 200 reconnaissance bombers costing approximately \$18,000,000. Addition of the spare parts order brings the total amount of the company's backlog of unfilled business to a new peak of approximately \$24,000,000.

The International Harvester Company is stepping up its activity in tractor manufacturing and the three plants in Chicago that are involved, and one in Milwaukee, and that in Rock Island, Illinois, will recall workers in accordance with seniority agreements in effect at each of the plants. Improved tractor sales in recent weeks, bringing about a considerable reduction in the inventories, is the reason why the men are being recalled.

The Racine and Kenosha Nash auto plants, closed for a time on account of labor difficulties, have been reopened. The Milwaukee plant which had also been closed as a result of the dispute at the other two plants, resumed work earlier in anticipation of the settlement.

It is reported that a new small, three-wheeled automobile will be manufactured in Kansas City and is expected to sell under \$500 at that city. Frame is to be made of aircraft tubing and the body is to be welded to it. There will be an air-cooled engine mounted as a unit with the rear wheels.

The Navy has awarded a \$1,655,410 contract to General Motors Corp., Diesel engine division, Cleveland, Ohio, for propelling machinery and generators for seaplane tenders under construction at the Puget Sound, Washington, Navy Yard.

The Lenert Airplane Company, is reported contemplating establishing a plant in Toledo. According to W. Lenert, head of the concern, such a plant would give work contracts to many other industries in the tool, machine

and parts field. Mr. Lenert intends to arrange a meeting with parts manufacturers soon.

Mr. Kirke W. Connor, President of the Micromatic Hone Corporation, Detroit, sailed October 6, on the "Queen Mary" for a European trip, having been invited to address several engineering societies.

### EAST

S. E. Dameron has announced that 65 acres of undeveloped land on the eastern edge of Newark, N. J., have been sold to the Chrysler Corp. for a \$250,000 automobile parts depot. The property with a 2600-foot frontage along the Pennsylvania Railroad, is expected to be developed at once for the parts depot and ample land is available in the tract for later expansion into an assembly plant.

The Union Carbide & Carbon Co. is expected to use a large part of the proceeds of its new financing in plant construction. The Electro-Metallurgical Co., a subsidiary, has acquired 300 acres at Sheffield, Ala., in the Muscle Shoals district. Through another subsidiary Union Carbide has acquired 200 acres near Texas City, Texas, for construction of a chemical plant. Work has been resumed on the company's Linde Air Products Co. plant near Tonawanda, N. Y. This involves an expenditure of \$1,500,000.

Recovering quickly from the effects of hurricane and flood, New England industry moved forward along a broad front in early October, with all indications pointing to sustained improvement in both sales volume and production. Industrial plant employment in Bridgeport during the third week of September reached the highest level since January, 1938, according to the Bridgeport Manufacturers Association. Hurricane and flood damage to manufacturing plants was confined chiefly to Hartford and the small industrial communities of Northern and Eastern Connecticut, although production was halted elsewhere for varying periods due to lack of power. In Hartford a number of plants in the low-lying North End were partly under water, including Terry Steam Turbine Co., Cushman Chuck Co., Henry & Wright Mfg. Co., Gray & Prior Machine Co., A. C. Loveland & Co. and Hartford Bed Spring Co. Executives of some of these plants threatened to move from the city unless dikes are built to protect them against further recurrence of floods. Roofs at the Colt's Patent Firearms Mfg. Co. plant in the South End were damaged by the gale, but the main factory largely escaped flood damage as dikes held against the encroaching river.



# Chapter Doings

by Geo. R. Keller

The Semi-Annual at **Pittsburgh** was the big event of October, and was it a meeting! Don't know how many made the trek but 450 sat down to dinner Friday evening. That dinner—chicken, a wonderful speaker and a grand floor show—was a Scotchman's paradise considering the low tariff. Pres. Wagner opened up, turned the works over to able Lt. Jim Weaver, who introduced the Mayor, who presented the keys of the town. Personally, I enjoyed the meeting, having been located in Pittsburgh 21 years ago, saw many old friends as well as new ones made since joining this A.S.T.E. And if anyone thinks that ours isn't a friendly Society let him attend one of our meetings—he'll know, then. And it's not all play, the Directors sitting down to session at 10 A.M. and winding up at 10:15 P.M. Believe me, the Directorate works and does things. Here's to the Annual meeting in March! Let's all bear that in mind and boost it to the limit.

**Cleveland** Chapter met Oct. 11th at Germania Turnverein Vorwaerts Hall, the weather fair and warmer. (Wish Jack Hawkey'd get a different meeting place or nickname it. The name gets me down.) A hundred Indians powdered for the second successful event of the season, express thanks to La-Pointe Machine Tool Co. for a great meeting. K. C. Monroe headed the discussion when the slides were shown, describing in detail the advancement of broaching and broaching machines. Gus Sealander handled the slides, like all professionals turned one upside down. After the pictures, W. J. Phaneuf engineer, answered questions on tooling and broaching and D. H. West described in detail the hydraulic pump that bears his name. The Chapter thanks Joe Federkiel and son for the public address system brought in at the meeting. Rudy Herrold of Addressograph Multi-graph Co. was there with a gang of ten, including Frank Baker of England, same company, Inspector Wade, Gov't Aeronautic Div., N. C. Garlshore of W. J. Schoenberger Co. and Nelson Sacha, East Shore Machine Products Co. Come again! Be regulars. Marvin C. Daw, Kelly Reamer Co., and R. Haserodt, Geometric Stamping Co., are new members. Welcome! Greetings to Al Witteman, past V. Ch'man Milwaukee Chapter, transferred to Cleveland, Milwaukee's loss their gain. Lindroth of Barber-Colman won free dinner, will attend next without fail. And listen, Indians, the next meeting is extraordinary, U.S. Navy Dept. showing sound movies of navy maneuvers. So bring sonny boy and any friend that cares to come.

**Rochester** University extended hospitality, dining room and auditorium to Red Wings Oct. 13th, some production time lost between last cup of coffee and session. All due, I'm told, to discussion of ladies apparel at one table, Emmett

Moore being the leading authority. A touchy subject, and the first time (?) to be included in tool engineering topics. Over a hundred were there when Ch'man Bartek turned the meeting over to Arrangements Com'tee Ch'man Wallace, who introduced Geo. M. Class of Gisholt Machine Co. Mr. Class quite thoroughly schooled the boys on turret lathes and automatic chucking tools, made a fine impression. Attendance greater than previous, with prospect that November will be even greater. The Red Wings aim to set the pace for neighboring rivals, the Buffalo Bisons.

**Racine** had a bang up dinner meeting at Racine Country Club Oct. 10th, 120 engineers and guests attending. Warner & Swazey Co. sponsor, their Mr. W. K. Bailey broadcasting on turret lathes and telescopes, of which stills of their first model—1881—were shown with movies of late model in various sizes. Many new tools were also discussed, W & S having developed nearly 300 items in standard tools and equipment the past 2 years. Aside from turret lathes, telescopes aroused great interest. Success in that field depends on practical engineering and design, accurate workmanship and perfection in optical elements. Messrs. Warner and Swazey became interested in building telescopes nearly fifty years ago, resulting in the strange but natural combination of machine tool and telescope manufacture in one plant. At present, company is finishing an 82" telescope for McDonald Observatory, U. of Texas. Mr. Bailey was center of a lively discussion, received a rising vote of thanks.

**St. Louis** Octoberd at Carter Carburetor Corp. plant, the meeting informal without speaker, movies of the picnic shown. A general discussion on

tool and die making proved interesting, after which Mr. Niemann escorted the members through the plant. The trip was inspiring and everybody eager for more. The first open meeting was held Sept. 29th at Socony Vacuum Oil Co., sound movies shown and Mr. A. C. Stutson holding an excellent talk on thread cutting oils and proper lubrication of bearings. Meeting well attended, with enthusiasm strong for future sessions.

**Hartford** started off with three hoots and a hurrah at dinner meeting at City Club Oct. 3rd—and listen, you A.S.T.E'ers, Hartford really cut loose, had 150 at dinner and 275 at the technical session. They've got what it takes. Dr. R. B. Ogilby, President of Trinity College, delivered an interesting address and introduced the speaker of the evening, Dr. John J. Caton of Chrysler Inst. of Technology. Dr. Caton delivered his usual broadside which was well taken by all assembled. This was the biggest meeting held by the Chapter, indicative of the growing importance of the work done by the Society, and plans are under way for big doings in November. With the shouting already started for December, it strikes me that they must have a real live publicity man. Note change of address of Sec'y F. L. Woodcock, moved to 58 Inlay St., Hartford; phone 6-9498.

**Milwaukee** held meeting Oct. 6th at Republican Hotel cafeteria, Milton Schmitt discoursing on melting machines and fixtures. His talk was technical but never dull. These Tool Engineers can really speak once started. Mark Hennessey's Industrial Relations Committee reported excellent progress in promoting better relations between Milwaukee Chapter and local industry. Foster Koehn announced that the coming winter lectures will be the best the Chapter has had. Emmer Houston is happily back on the job, Mel Costello and

Rockford Chapter's first anniversary was celebrated September 29 at the Hotel Faust. More than 185 members attended with many guests and friends. Below is shown the speakers' table, reading from left to right the Messrs. Severson, Vice-President of Barber Colman Company; Purdy, President Greenlee Bros. Company; Flanders, Jones & Lamson Machine Company President and speaker of the evening; Dickett, Rockford Chapter Chairman; Lamb, Executive Secretary of A.S.T.E.; "Charlie" Brown, Mayor of Rockford; Johnson, President of Barnes Drill Company; Gridley, President of Mechanics Universal Joint Company; Thomas, President, Radio Station WROK. In the foreground left to right are shown Co-chairman Johnson and Mr. Zuck, both of the W. F. & John Barnes Company.



Irv. Schober on the sick list. Rally, boys! E. J. Laur walked off with the door prize. The American Society for Metals is offering a course on **Tool Steels** starting Nov. 7th, many A.S.T.E.'ers availing themselves.

**Toledo** met at Toledo Yacht Club Sept. 27th. Ch'man Gus Ehrhardt, presiding, introduced Pres. Wagner who played up the Pittsburgh meeting. Frank Crone, Nat'l Treas., was there too, spoke to the boys. Sam Burgess reported 5 new members during vacation period. Bob Haynes introduced the speaker, E. Mosthaf, Chief Engineer of Electric Auto Lite Company (Spark Plug Division) Fostoria, O., and a member of the Chapter, who gave an illuminating talk on the tooling and processing of spark plugs. Movies, depicting manufacture from start to finish, illustrated the talk. A lively discussion ended the session. Wonder what Bob Haynes talked about? Heard about a speech of his in Buffalo that brought down the house. And what's become of Herb Tigges? I don't see his name in print and wonder if he spends all of his time at home in the suburbs. Ye Chapter Editor apprenticed in good old Toledo, recalls the time we would go from Maumee to Perrysburg to call on the girls across the river. That stretch between Turkey Foot Rock and Buttonwood Island has given me many pleasurable hours fishing for the elusive black bass. There I go again, thinking of bygone days when I wasn't so handsome but full of vim, vigor and vivacity.

**Rockford** Chapter broke out with hives or something at their birthday party held at the Faust Hotel Sept. 29th. Before going any further I want to shout three times because those Scandinavians really go places; in one year, have grown from 113 charter members to 185, and boy, that's growing! Attendance has soared from 150 at first gathering to 500 at the birthday party. Manufacturers' exhibits at the meetings increase, 15 fine displays shown at Sept. meeting. Local manufacturers are showing an increased interest in the A.S.T.E., as of course they should. And now, let's look in on the birthday party. You ride up to the 11th floor, pass the check room, then register, receive a lapel badge announcing name, address and place of employment. Entering the lounge, you are in the midst of a miniature Tool Show, each exhibit marked by manufacturer and attended by a representative busy answering questions. The large room, horseshoe shaped, rapidly filling, the buzz of animated conversation, good fellowship prevailing.

Dinner announced, so into the south ballroom, tables set close, the long speakers' table adorned with a huge birthday cake. There, seated, we note E. W. Dickett, Chapter Ch'man, Ralph E. Flanders, Pres. of Jones & Lamson Machine Company, Ford Lamb, our own Exec. Secy. and Chas. F. Brown, Mayor of Rockford. Music! By courtesy of Crystal Lake Machine Co. During the dinner a floor show; glorious girls! The dinner over, the Entertain-

ment Com'tee pulled another surprise, awarded several golf clubs as prizes. Followed short speeches by Messrs. Flanders, Lamb and Brown, then, belts straining and pockets bulging with favors, an interlude for banter and laughter, inspection of exhibits. Then to the north ballroom for the technical session, the pleasure of hearing Ralph Flanders, with his rare New England wit. And Ford Lamb, who invited all to Pittsburgh. That man just lives the A.S.T.E. The session over, the assemblage lingered, reluctant to leave the scene. But then, the Ent't Com'tee outdid itself, set a mark hard to equal at future meetings. So, hats off to you, Rockfordites. Skoall

**Pittsburgh** Tool Engineers are appreciative of the fine spirit and friendly co-operation shown by the visitors at the Semi-Annual. For information to those still trying to get the pencil out of their button holes, note: take a sharp knife, grasp firmly, insert blade in button hole, cut button hole and presto—the pencil is out. "Jock" MacLamb note: the \$15.00 per week budget for Tool Engineers won't work but reads like good fun.

**Buffalo** Chapter met at Buffalo Trap & Field Club Oct. 10th, Geo. M. Class of Gisholt speaker, Ch'man Taylor presiding, pulled for the Pittsburgh meeting. New memberships aroused lively discussion, agreed that none connected with machine tools could afford not to belong to A.S.T.E. Right! Conspicuous were Charley Bruun who came late, a/c his Mrs. had regaled him with pickled herring, Clarence Fuller who left early—why, I don't know—and Publicity Ch'man Ernie Dildine who didn't come at all. Him being a batch takes a good alibi. But thanks to Ed MacDonald, or we'd have missed this issue. Mac says that the ladies suspect culinary competition, make the boys eat at home and like it. More power to the girls as long as they let the members out for the stimulating part of the evening, only my missus would like to know what it consists of.

Geo. W. Wise, **Twin City** Ch'man, sends apologies for not forwarding news re Sept. meeting, failure due to illness of P. A. Clark, Pub. Ch'man. Glad you're back on the job, P. A.; hope you'll be battling 100% next month.

**Cosmopolitan** Chapter (N.Y.—N.J.) is moving along. Sept. 24th, Tom Orchard put on a swell golf tournament at Basking Ridge, N.J. It must have been good because Prex. Wagner and Ford Lamb came all the way from Detroit to play and believe it!—Ford took the prize for the highest score—148. Well, I'm not surprised, Ford being too busy with A.S.T.E. work to keep in practise. (That good for a personal letter, Ford?) Harold Welch had the lowest gross and his name goes on the A.S.T.E. trophy—at his expense. (My own idea.) Growing importance of the A.S.T.E. shown by invitation of older American Society for Metals to hold joint session with its New Jersey Chapter. This took place Oct. 10th at Essex

House, Newark, the hostelry that served as maternity ward for lusty No. 14 a year ago. Because of joint meeting and two important speakers slated, Ch'man Sheely made only briefest announcement, didn't even mention T. O. and his golf tournament. G. M. Rollason, of Aluminum Co. of America and local A.S.M. Ch'man presided at joint meeting. Speakers, S. C. Spaulding, Metallurgical Engineer, American Brass Co., spoke on tool steels, changes in composition and effects of heat treatment; J. J. Crowe, Welding Engineer, Air Reduction Sales Co., described, with lantern slides, recent applications of flame hardening and softening. (I met Bill Brown of Cosmopolitan at Pittsburgh and he's the sort one likes to meet again.)

October meeting of **Baltimore** Chapter was for members only out of regard for Pittsburgh session. No technical talks, instead, two hours house cleaning with various issues brought into the open, some disposed of, some shelved for future consideration. John O'Connor, financial wizard, proved that running the organization with southern judiciousness is the right way. Meetings Ch'man Buckley hints at a dance in the near future. No one realized how many Clark Gables and Greta Garbos were connected with this Chapter until E. Beubel showed movie shots of last summer's picnic. Monday, Oct. 17th, the boys visited Western Electric plant, came away the wiser.

**Syracuse** met Oct. 12th. Geo. M. Class of Gisholt repeated talk at Buffalo and Rochester. Met Ch'man Mitchell at Pittsburgh, and by the way, Gene Bouton of Racine wanted to know why Mike Adams of Syracuse wasn't there. That reminds me: while enroute from Cincinnati to Buffalo Oct. 12, super salesman Jack Owens promised me that he'd be in Pittsburgh Friday if he got two certain orders on Thursday. I didn't see him, so draw conclusions.

Ch'man Dundore of **Bridgeport** hasn't missed a meeting since the Chapter was started, lapsed a/c Semi-Annual. Ben Page officiated as pinch hitter and did a swell job. Members present saw the Allen Mfg. Co. via film presented by Mr. Horner (who is Newark A.S.T.E.'er) and Mr. Gates, Chief Engineer at Allen. The film showed complete manufacture of screws from raw stock to final test.

**Cincinnati** Chapter held its first fall meeting at Cincinnati Milling Machine Company plant Thursday evening Sept. 15th. Arriving, Society members inspected the new Employees Recreation Field and the East Lodge. This suited the boys, who entered into the spirit of the thing and soon games were in progress. Dinner at 6:30, then a brief inspection trip through the plant to see some very interesting machines in operation. Assembled in the Conference room, F. V. Geier, Cincinnati Milling President, extended greetings in a brief talk, was followed by President Wagner and V. Pres. Smart of the A.S.T.E.

(Continued on page 34)

# November Chapter Meetings

Chapter Meeting Announcements must be received on or before the 20th of preceding month to appear on this page. Members and friends of The Society contact Chapter Secretaries for meeting details if your announcement does not appear below.

## BALTIMORE

November 14, 1938—Dinner 7:00 P.M., Technical Session 8:00 P.M. Hotel Longfellow.

Speaker: Mr. W. W. Broughton, New Jersey Zinc Sales Co.

Subject: "Considerations Pertinent to Designing for Die Casting."

Reservations: J. Harvey Chandler, Secretary, 3216 Taylor Ave., Baltimore, Md.

## BRIDGEPORT

November 10, 1938—Dinner, 6:30 P.M. Dutch treat at Hotel Barnum. Technical Meeting 8:00 P.M.

Speaker: George M. Mencke, Vascology-Ramet Corp.

Subject: "Machineability of Materials, High Speed and Carbide Tools" and will outline the fields of use for these tool materials. Also comments on modification of the Taylor System due to the carbide tools and higher speed in use today. Illustrated with slides.

## BUFFALO

November 14, 1938—Dinner, 7:00 P.M., \$1.25 per plate. King Arthur's Restaurant, 199 Delaware Ave., Buffalo.

Speaker: A. H. d'Arcambal, Pratt & Whitney Co.

Subject: "Recent Developments in the Cutting Tool and Gauge Fields."

Reservations: Wm. Weinreich, 649 Minnesota Ave., Buffalo, N. Y.

## CHICAGO

November 7, 1938—Chicken Dinner, 6:30 P.M. Technical Session, 8:00 P.M. Railway Exchange Bldg., 80 E. Jackson Blvd.

Speaker: Ira J. Snader, Research Engineer, Ex-Coll-O Corp.

Subject: "Precision Thread Grinding and Moving Pictures Prepared by Massachusetts Institute of Technology."

Reservations: Mail reservations and questions on thread grinding problems to Robert O. Hein, 2243 Lincoln Ave., Chicago, Ill.

## CINCINNATI

November 10, 1938—8:00 P.M. at Ohio Mechanics Institute.

Speaker: John C. Cotner, General Manager, Logansport Machine Co.

Subject: "Air & Hydraulic Circuits."

Lunch and Beer following talk.

## CLEVELAND

November 18, 1938—Dinner, 6:00 P.M. Technical Session 8:00 P.M. Germania Turnverein Vorwaerts (German Club), 1622 East 55th St., Cleveland.

Subject: Motion Pictures with talkies of the United States Navy Manuevers.

Reservations: Dinner a la Carte—Make reservations with Mr. H. P. Boggis—Endicott 3611.

## DAYTON

November 14, 1938—6:30 P.M. Gibbons Hotel.

Speaker: Herman Goldberg—Chief Engineer & Supt. R. G. Haskins Co.

Subject: "Taps & Tapping Machines."

Reservations: Walter Olt—Fu. 3113.

## DETROIT

November 10, 1938—At General Motors Yellow Coach and Truck Division, Pontiac, Michigan. Cafeteria Dinner. Program not yet definitely arranged. Members will be advised at a later date.

## HARTFORD

December 5, 1938—Dinner, 6:30 P.M. City Club of Hartford, Allyn and Trumbull Streets.

Technical Session: 8:00 P.M.

Speaker: Hans Ernst, Research Director Cincinnati Milling Machine Co.

Subject: "Metal Cutting"—with new Movie.

## MILWAUKEE

November 10, 1938—6:30 P.M., Republican Hotel.

Speaker: D. A. Wallace, Chrysler Corp.

Subject: "Super Finishing."

## NEW YORK - NEW JERSEY

November 15, 1938—Dinner 6:30 P.M. Meeting 8:00 P.M. Hotel Robert Treat, Newark, N.J.

Speaker: Mr. Henry Kurtz, Mechanical & Optical Engineer, Bausch & Lomb Optical Co.

Subject: "Optical Measurements."

Reservations: Ben Brosheer—Medallion 3-0700.

## PITTSBURGH

November 11, 1938—6:30 P.M. McCann's Dining Room.

Speaker: Mr. W. K. Bailey, Assistant Sales Manager Warner & Swasey Company.

Subject: "Turret Lathes and Tool Development" (moving pictures and slides)

Reservations: Call Miss Wingard, Brandywine 1500, Extension 9264 for dinner reservations.

## RACINE

November 14, 1938—Dinner, 6:30 P.M., Hotel Racine, Crystal Dining Room.

Speaker: D. A. Rogers, President Dayton Rogers Mfg. Co., Minneapolis, Minnesota.

Subject: "Economical Production of Metal Stampings in Small Lots."

Display: Tools and Samples of Parts.

## ROCHESTER

November 15, 1938—Dinner, 6:30 P.M. at Todd Union. Price \$1.00. Discussion at Strong Auditorium at 7:45.

Speaker: Mr. A. H. d'Arcambal, Metallurgist, Pratt & Whitney.

Subject: "Cutting Steels, their Heat Treatment and Use" with slides.

## ROCKFORD

November 10, 1938—5:00 P.M. to Midnight. Faust Hotel (entire 11th floor).

6:30 Dinner: Make Reservations to Allis-Chalmers, (Electrical Division) Talcott Building, Phone—Main 6270—Closing Date Nov. 8, 1938. Rate \$1.00 per person. Twelve Educational Exhibits in charge of experienced demonstrators.

7:30 to 8:15: Recess to Visit Exhibits. 8:15 to 9:30 Technical Session.

Speaker: William A. Hart of Colonial Broach Co.

Subject: "Broaching & Broaching Machines."

9:30 to 12:00: Adjournment to visit displays where many new and interesting tools and devices will be shown—some for the first time.

## SCHENECTADY

November 10, 1938—Rice Hall, General Electric Co., Schenectady, New York.

Speaker: R. O. Beardsley of Jones and Lamson Company.

Subject: "Inspection by Optical Projection."

Note: This is not a dinner meeting.

## ST. LOUIS

November 3, 1938—Dinner, 6:30 P.M., \$1.00. Northside Y.M.C.A.

Speaker: Mr. J. C. Fox, Doehler Die Casting Co.

Subject: "Die Castings."

Reservations: C. J. Steinman, Newstead 0800.

## ST. PAUL - MINNEAPOLIS

November 16, 1938—Dinner, 6:30 P.M. Minnesota Union.

Speaker: Representative of Carboly Co., Inc.

Subject: "Tungsten Carbide Tools."

Reservations: Not later than November 15th. Phone E. W. Pennington, RE0462.

## SYRACUSE

November 9, 1938—Dinner, 6:30 P.M. Talk, 8:00 P.M. Syracuse Industrial Club.

Speaker: A. H. Hancock, General Superintendent International Business Machines Corporation.

Subject: "The Tool Engineer and His Place in Industry."

## TOLEDO

November 29, 1938—6:30 P.M., Dinner, \$1.00. Toledo Yacht Club.

Speaker: Mr. Ralph A. Powers.

Subject: "Photo-electric Devices and Their Application in the Industry."

Reservations: Reservations may be obtained from Lorence E. Renell, 206 Crawford Ave., Toledo, Ohio. Business Phone LA2161. Residence Phone JE2900M.

## CENTRAL PENNSYLVANIA (YORK, PA.)

November 15, 1938—Dinner, 6:30 P.M., Y.M.C.A., Philadelphia and Newberry St., York, Pa.

Technical Session, 7:45 P.M.

Speaker: William Stegman, Westinghouse Electric & Manufacturing Company, Lester Plant

Subject: "Methods, Equipment and Time Study"



# New Vickers "Double Pump and Combination Valve Unit" Provides Automatic Volume Control

By  
L. R. TWYMAN  
VICKERS, INC.

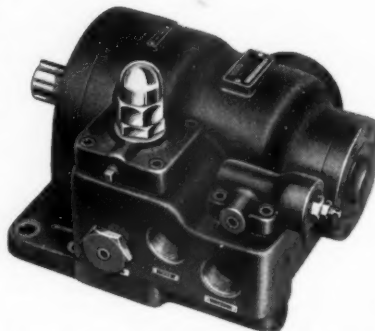


Fig. 1—Larger Series Foot Mounting Vickers Combination Unit

HOW, in a hydraulic control circuit, can two pumps of the "constant volume" type operate so that their action compares with that of a "variable volume" pump? Variable volume is notably used in so called "traverse and feed" cycles, which require a relatively large volume of oil for "rapid approach" and "rapid return" motions, and a relatively small volume of oil for the slower "feed" motion. Other hydraulic applications, such as presses or clamping devices, also require variable volume hydraulic action of similar characteristics.

All but the smaller size hydraulic installations of this class should have pumps which can automatically vary their output to take care of either large or small volume requirements. The new Vickers "Double Pump and Combination Valve Unit" is capable of doing just that,—while still maintaining the design and construction simplicity and the low cost of constant volume pumps. Fig. 1 illustrates one of the Vickers Units recently placed on the market; flange mounting types are also available.

To visualize the method of operation of this new Vickers Combination Pump one should picture two Vickers Balanced Vane pumps driven by a single shaft with the output of one pump being available to the hydraulic working system under all circumstances, and the other automatically cutting in only whenever it is needed. When not needed for large volume requirements, the second pump merely recirculates oil without pressure resistance. Thus, the one pump (usually the

smaller) may supply oil for feeding operations, and both pumps can supply oil for faster moving traverse operations.

Fig. 2 indicates by means of a schematic diagram the operation of the Vickers unit. During traverse motions the pressure in the working system is relatively low. Low pressure at the unloading valve chamber "R" causes the second pump delivery to join that of the first pump and the combined volume

is therefore available for the low pressure traverse motions. Whenever feeding action begins, pressure in the system is built up because of the introduction of a flow control metering valve into the active circuit. This immediately builds up system pressure, and pressure at "R," so that the entire volume of the second pump is allowed to discharge to tank at no back pressure.

The unloading valve may be externally adjusted so that the second pump delivery may be unloaded to tank at the desired pressure. An integral relief valve is also included in the Combination Pump Unit and functions to control the maximum system pressure. It is readily adjustable to any pressure up to 1000 lb. per sq. in. maximum.

Wide ranges of Vickers pump sizes are available, and a combination of two pumps in the Combination Unit can be selected which will meet practically any traversing, feeding, clamping or other general purpose requirements. By correct selection of these pump sizes excess pump volume at any time during working cycles may be eliminated and the drive motor load can be distributed to the most profitable advantage. For this reason, which is derived from the variable volume effect, a smaller electric drive motor can be specified.

The new Vickers designs are more compact and more readily assembled than ever before, and they have many operating advantages which are described in a folder available from Vickers Inc., 1400 Oakman Blvd., Detroit.

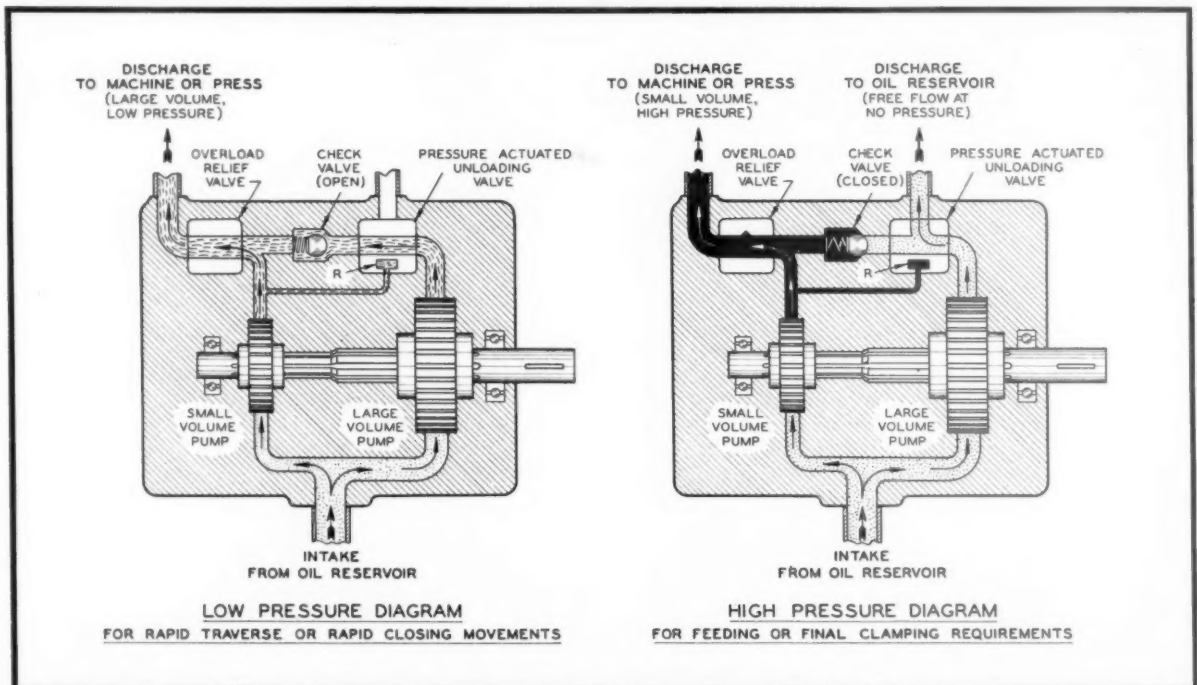


FIG. 2—SCHEMATIC FLOW DIAGRAM OF VICKERS "DOUBLE PUMP & COMBINATION VALVE UNIT," SHOWING METHOD OF AUTOMATIC VOLUME CONTROL



# Look 'Em Over!

## NEW TOOLS AS FEATURED BY

# STARRETT



A precision Planer and Shaper Gage. No. 599 has a range of  $\frac{1}{4}$  to 9 inches. Alignment and parallelism of ends, slides and work contacts is held to close limits and lateral play is eliminated. Note built-in level.



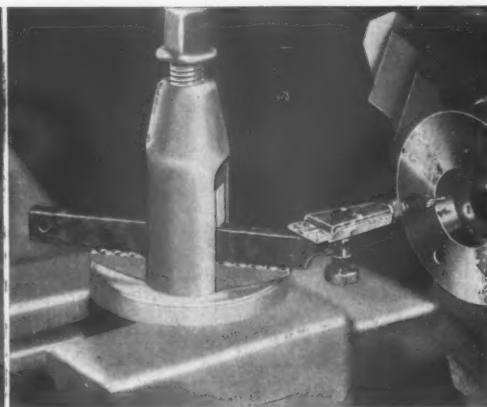
No. 829 fills a need for practical, inexpensive gages for small holes. Four gages cover a range from  $\frac{1}{8}$  to  $\frac{1}{2}$  inch. Quick adjustment and sensitive contact makes it easy to feel small hole dimensions accurately and transfer to a micrometer.



No. 828 Center Finder or "Wiggler" takes care of countless operations requiring accurate location of working points in jig and tool work, with milling and vertical machines, drill presses, etc. Point is spring cushioned for protection, is easily brought to concentricity with machine spindle, and telescopes into body when not in use.

For complete description, prices, etc., see new Starrett Catalog No. 26T. Write for copy.

**THE L. S. STARRETT CO., ATHOL, MASS., U. S. A.**



Flexibility combined with accuracy and an unusually low price make the No. 564 "Universal Junior" a real bargain. Ball contact can be set at any angle and rotated in friction sleeve. Indicator can be mounted on side or top of shank or on height gage. Graduated scale always positioned for easy reading. Range .012 by thousandths.

World's Greatest Toolmakers — Manufacturers of Hacksaws Unexcelled — Steel Tapes, Standard for Accuracy — Dial Indicators for Every Requirement

*Standardize on*  
**STARRETT TOOLS**  
BUY THROUGH YOUR DISTRIBUTOR

## Handy Andy's .. WORKSHOP ..

I attended, recently, the silver anniversary of an esteemed friend, listened as representatives of various organizations—social, civic, fraternal—paid him honor, as his employers lauded him, as friends among the congregation praised him and his wife, his children, for their work in the church of which they are members. Called on to speak, he said in effect: "I have been acclaimed beyond reason, cannot live up to it; it is all greatly exaggerated. It is not that I have done these things so much as that this church has been an inspiration to me; there was work to be done, I was called on and merely contributed my share with the rest." My friend, by

the way, is an A.S.T.E. member, quietly remaining in the background until the time comes when he is needed.

I sat, at Pittsburgh, with the new A.S.T.E. Directors, each of whom showed evidence of leadership, each of whom proved, by his very presence, that he is one of the minority of "doers" that carries the major load in the march of progress. Without that minority, civilization would be arrested, there would be no progress, no science; humanity would still be in the murk of savagery. On that minority, then, rests the responsibility of leadership for the masses of humanity. And, each of that minority waits his turn to be called, each contributes according to ability or, as the case may be, as opportunity affords, finding inspiration in a worthwhile objective.

Gentlemen, it was a great meeting, should have had many times the attendance, was a great event nevertheless. For me, a red letter event, the

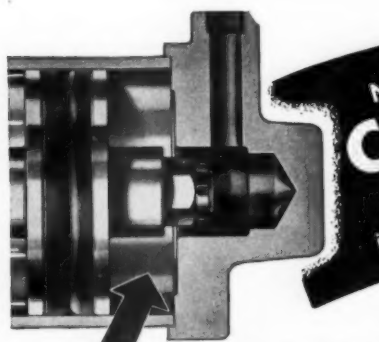
first time in three years that I haven't been on the pan; it clean took the wind out of my sails. Oh well, better luck—uh, I mean, I'll be all right after I've had some sleep. Jim Weaver and all of the Pittsburgh outfit did themselves proud, and Jim, you know what I said, anything you want we'll give it to you, the other guy willing. Anyway, we know by now what makes you click; the way you took charge of the town during our stay augurs well for the future of the A.S.T.E. Thanks—and it's unanimous!—for a good time, an inspirational convention of Tool Engineers.

I've often wondered just why the Delaware Swedes surrendered to the Dutch, but after listening to Connie Hersam at the Board meeting I got the answer. Those Dutchmen just talked the Swedes into surrender. No, gentlemen, there isn't a sting in the entire hive; the guy's okay, is a live worker who is plugging for the A.S.T.E. while keeping the home town on the map. Go to it, Philly!—it's that spirit of friendly competition that speeds the A.S.T.E. to leadership in the engineering world. And as for me, I am glad I had faith in the Society from the beginning, sensed its innate friendliness, its fine spirit of progress, have broadcast my beliefs and find the best that I have said justified by the results. We must not, however, let our enthusiasm get the best of us; it's a good idea to let the boys back home in on things once in a while. "Ask dad, he knows."

I have, now, among my cherished possessions a bottle of Haig & Haig (empty) with the autographs of the entire '38-'39 Board on the label, Frank Shuler and Ray Brunner excepted. I'll get their J. Hancocks in due time. I missed Ray, nor must we forget the way he has plugged for the Society. Joe deMontigny, proxying for ex-prex Shuler, took his duties with the seriousness of one of the nine old men. Got acquainted with Nils Lou—never could figure out that combination before—and with Skinny Doogan's old man; he's quite a feller. Geo. Wise and I are old friends by now, and like all the rest of this man's outfit he grows on one. You know, I'll get around to 'em all after a bit; it's just that, meeting so many all at once, names and faces get kind of mixed up. Anyway, you boys North, East, West, South picked good men; they're a cagey lot and anyone that slips anything over on 'em will have to get up before the early bird's breakfast.

Flashes: Prex Wagner is showing us what makes him tick with the Ford Motor Company. It's performance, men; the guy has something on the ball and his boss knows it. I. F. Holland, succeeding the ol' reliable d'Arcambal, carries on the best traditions of Hartford. Bob Lippard (and thanks, Bob, for what you did!) has got himself promoted and moved to Worcester. Great town, that, my wife's home town, by

(Continued on page 28)



## AIR CUSHION

*Stops Metal-to-Metal Impact  
in All Nopak Cylinders*



For Complete Details of the  
New NOPAK Cushioned Air  
Cylinders write for Illustrated  
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Now, a Complete Line of  
**CUSHIONED**  
AIR CYLINDERS  
in the "No-Cushion" Price Range

● Score another "first" for NOPAK! Now all NOPAK AIR CYLINDERS are CUSHIONED... with either adjustable or non-adjustable cushion heads.

NOPAK Air Cylinders with non-adjustable, positive, pneumatic cushion-stop sell in the same price range as non-cushioned cylinders. Noisy, damaging, metal-to-metal impact is eliminated, cylinder life prolonged. This means lower maintenance costs, smoother, more efficient performance for all air-operated equipment.

NOPAK Adjustable-Cushion Cylinders permit positive control of the exact degree of cushioning desired at the end of the piston stroke.

NOPAK Special Composition Cup Packing and extra-wide piston bearing protect cups from excessive wear and friction.

Companion Products to NOPAK Control Valves for Air, Oil and Water.

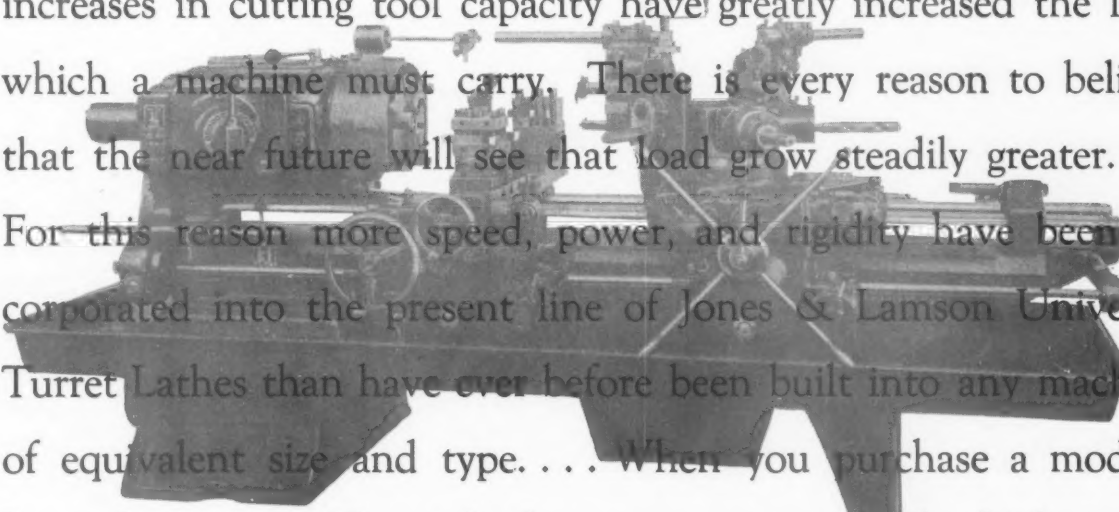
**GALLAND-HENNING MFG. CO.**

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MILWAUKEE • WIS.

**NOPAK** VALVES  
and CYLINDERS

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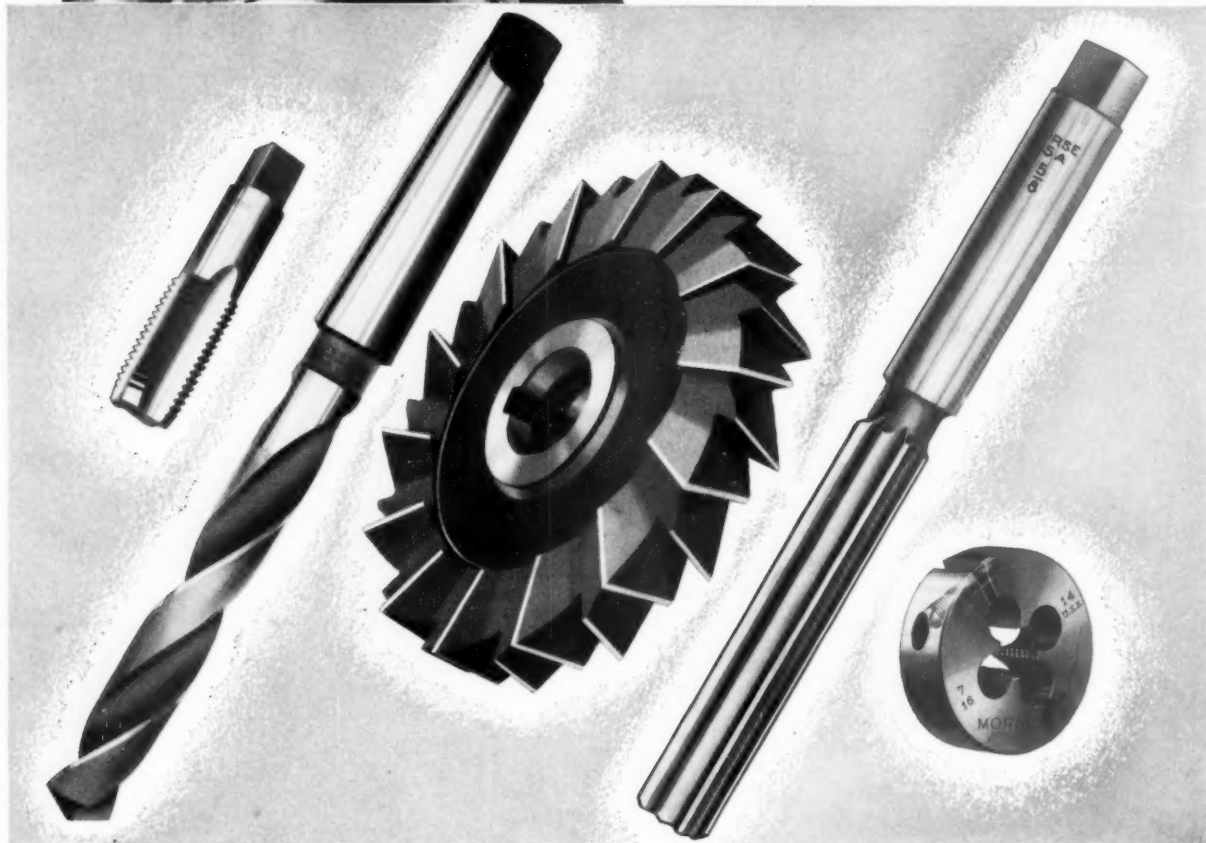
IN 1848, the parent companies of Jones & Lamson designed and built their first Turret Lathe. Continuously and actively, these companies, and their successor, the Jones & Lamson Machine Company, have been improving the design and increasing the capacity of Turret Lathes. These modern machines are the result of a background of experience, coupled with scientific studies of machining problems, cutting tools and machine design. . . . Recent increases in cutting tool capacity have greatly increased the load which a machine must carry. There is every reason to believe that the near future will see that load grow steadily greater. . . . For this reason more speed, power, and rigidity have been incorporated into the present line of Jones & Lamson Universal Turret Lathes than have ever before been built into any machine of equivalent size and type. . . . When you purchase a modern Jones & Lamson Turret Lathe you are assured of a high return from every dollar invested; of ample speed, power, and rigidity to carry the burdens imposed by present-day cutting tools, and of capacity to stand up and deliver at a profit under the load which will surely be imposed upon it by the future development in carbide tools or in some other hard alloy. ☆ ☆ ☆



JONES & LAMSON MACHINE COMPANY  
SPRINGFIELD, VERMONT, U. S. A.



**BENEATH NEARLY EVERY SMOKESTACK  
DRILLING, REAMING, MILLING AND  
THREADING ARE MAJOR OPERATIONS....  
THE QUALITY OF THE TOOL AT THE  
WORKHEAD CONTROLS PRODUCTION  
SPEED AND PRODUCTION COSTS.**



# MORSE

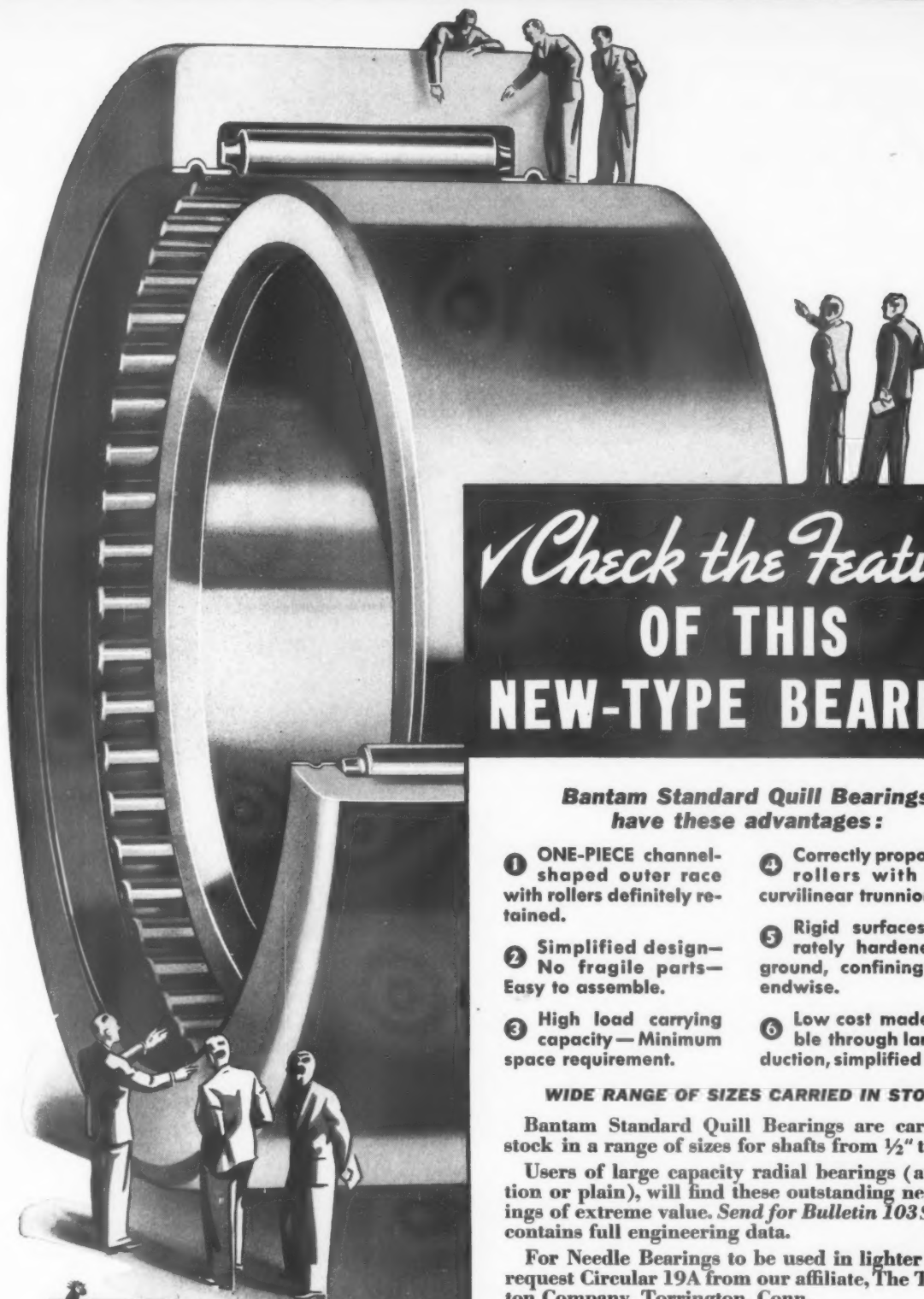
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## ✓ Check the Features OF THIS NEW-TYPE BEARING

**Bantam Standard Quill Bearings  
have these advantages:**

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| <p>① ONE-PIECE channel-shaped outer race with rollers definitely retained.</p> <p>② Simplified design—No fragile parts—Easy to assemble.</p> <p>③ High load carrying capacity—Minimum space requirement.</p> | <p>④ Correctly proportioned rollers with husky curvilinear trunnions.</p> <p>⑤ Rigid surfaces, accurately hardened and ground, confining rollers endwise.</p> <p>⑥ Low cost made possible through large production, simplified design.</p> |
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### **WIDE RANGE OF SIZES CARRIED IN STOCK**

Bantam Standard Quill Bearings are carried in stock in a range of sizes for shafts from  $\frac{1}{2}$ " to 5".

Users of large capacity radial bearings (anti-friction or plain), will find these outstanding new bearings of extreme value. Send for Bulletin 103S which contains full engineering data.

For Needle Bearings to be used in lighter service request Circular 19A from our affiliate, The Torrington Company, Torrington, Conn.

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**TAPERED ROLLER • • • STRAIGHT ROLLER • • • BALL BEARINGS**

Mention "The Tool Engineer" to advertisers

THE TOOL ENGINEER FOR NOVEMBER, 1938

# Now ECLIPSE ANNOUNCES with **MIKRO LOK**

## 5 IMPORTANT PROVEN FEATURES

- |                                   |                                       |                            |                               |                               |
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| ★                                 | ★                                     | ★                          | ★                             | ★                             |
| MICROMETER<br>BLADE<br>ADJUSTMENT | FLOATING OR<br>NON-FLOATING<br>BLADES | SELF-<br>LOCKING<br>BLADES | AUTOMATIC<br>BLADE<br>RELEASE | MAXIMUM<br>BLADE<br>EXPANSION |

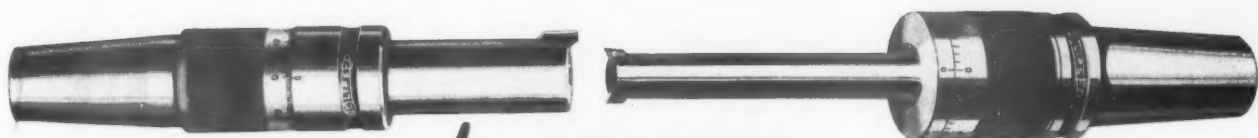
Multi-Diameter—Radial Drive—now MIKRO-LOK! Eclipse again sets the pace with the introduction of another perfected advancement in tool design that promises new savings for industry! Evidence of adherence to a forward policy that has been our guiding light for a quarter century.



WRITE FOR COMPLETE MIKRO-LOK DATA

**ECLIPSE COUNTERBORE CO.**  
**DETROIT, MICHIGAN.**

# INTRODUCES A NEW BORING TOOL LINE

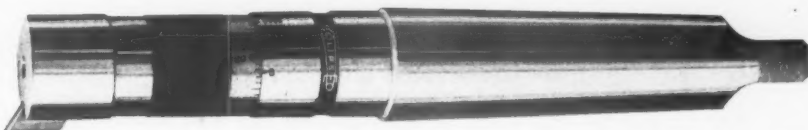


*for* PRODUCTION

Precision tools (.00025" adjustment) for high speed boring machines for finishing holes .500" diameter and up. Within the bar is a unique, simple, rugged mechanism connecting the blade with the adjusting dial. Quickly set to size required—"Like a micrometer!"

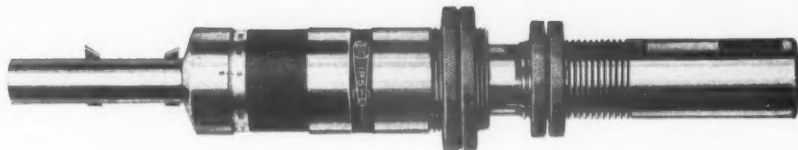
## FOR JIG BORING

Eclipse standardized MIKRO-LOK bars with shanks to fit various jig boring machines are adjustable in increments of .00025" and will bore holes from .750" diameter to 4.0000". Range of blade expansion, from 1/4" on smallest bars to 1" on larger bars.



## 2 ENDS, 1 OPERATION

When in proper location, the cutters of this feedout type recessing or grooving tool are automatically expanded to the required diameter, chamfering two ends of the work in one operation. An example of special tooling available from Eclipse Boring Bar Division.



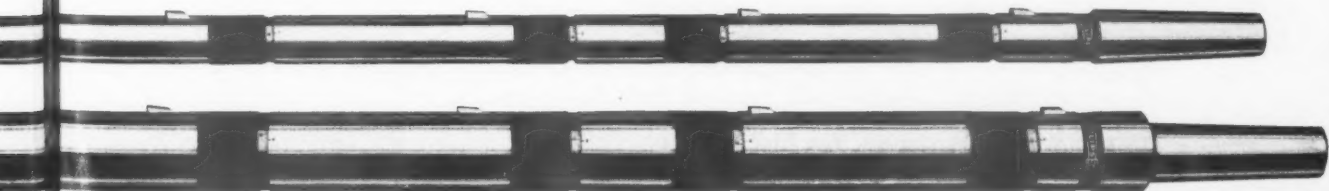
## IT BORES or IT REAMS

Ideal for tool rooms and small production shops. Each size bar will progressively enlarge holes over a wide range. Available with either fixed blades for boring or floating blades for reaming.



## FOR LINE BORING

These bars finish bore automotive cam and crank bearing holes in line. Each cutting blade is individually adjustable in increments of .0005" by means of Eclipse MIKRO-LOK.



## HANDY ANDY'S WORKSHOP

(Continued from page 22)

the way. Bert Carpenter has taken to eating orange juice with a soup spoon, and what's wrong with that? Slim McClellan has organized the Order of the Hounds, charter members and all. Ask Bill Hanson. By the way, do you recall that, immediately after Mr. Van Deventer's talk, the headlines proclaimed the President's armament plans, launching a boom in machinery and tools. Was it prophecy, or inside stuff? Either way, it was a great speech, authoritative and well considered.

I had the rare pleasure, at Pittsburgh, of sitting to dinner with Eric Oberg,

editor of "Machinery," am indebted to Dickett of Rockford for the introduction. Mr. Oberg didn't know it until I told him, but we're really old friends, I having felt that way about him these many years. What surprised me was his comparative youth; I had pictured him as much older, perhaps because of his wealth of experience and breadth of concept. And the man is broad, in knowledge of world events, in the possession of a liberal education that only travel, wide reading and an innate sense of the fitness of things can bestow, I express the wish that a chance meeting may ripen into a fine and enduring friendship.

I am, personally, just "pink" enough

to believe in cooperation, which in no-wise implies a surrender of individuality. And that, of course, definitely puts me out of the pink class. But I want to see a closer coordination between engineers of all classifications, that mutually we may promote civilization to higher standards. And, the best medium of propagation is the technical press, in which "The Tool Engineer" is now definitely among the leaders. I am, personally, convinced that "The Tool Engineer" is subjected to closer and more critical reading than any of its contemporaries; it has that indefinable something that we call personality, it implies a responsibility to its readers. Only recently, a Tool Engineer who has won deserved promotion showed me an item a couple of years old, in which he had been mentioned. And others, winning recognition, have reminded me of a friendly boost that has made the grade a bit easier. But then, this is a friendly Society; we grow in that spirit.

I am, further, convinced that advertising in "The Tool Engineer" pays in definite returns, a conviction based on direct evidence. That statement in no-wise impugns the value of the technical press as a whole—there is no better medium of advertising for the machine, tool and appliance manufacturer—and the wise manufacturer and distributor advertises in all of the leading publications, which naturally includes "The Tool Engineer." Our boys may omit mention when inquiring, but you may rest assured that they don't neglect the most careful scrutiny of our pages, and that means from cover to cover. I know, and I'm telling you.

Concluding, a few remarks at random. Who can place a bright, up-and-coming young fellow in a toolmaking apprenticeship course. Write me care of "The Tool Engineer"—and thanks for information on previous requests. Also, much obliged for the ash trays (I won't mention the donors lest they be flooded with requests) and the calendars; I really didn't expect any this early. And Ray Farmer (he's the A.S.T.E'er who is making big thunder in the midget racing game) I have to take it all back about getting into the racing game, on account the wife won't let me. She says I'm sure to get my neck broke, the way I stick it out. But it was lots of fun, thinking about it. Well, that ain't all, but it's all I can do this issue. See you next month.

Yours for Progress,  
Handy Andy.

## FENN COLLEGE TO HAVE STUDENT CHAPTER

Student Chapter No. 2 was chartered at Fenn College, Cleveland, November 2. Ford R. Lamb, National Secretary, and other A.S.T.E. Officials attended.

**TO LENGTHEN  
GRINDING WHEEL LIFE  
INVESTIGATE**

**Stuart's  
CODOL**  
Liquid Grinding Compound

**NEW — DIFFERENT — BETTER**  
Recommended by nearly all grinding machine and grinding wheel makers. Phone or write today for Free Working Sample and 24 page "CODOL" booklet.

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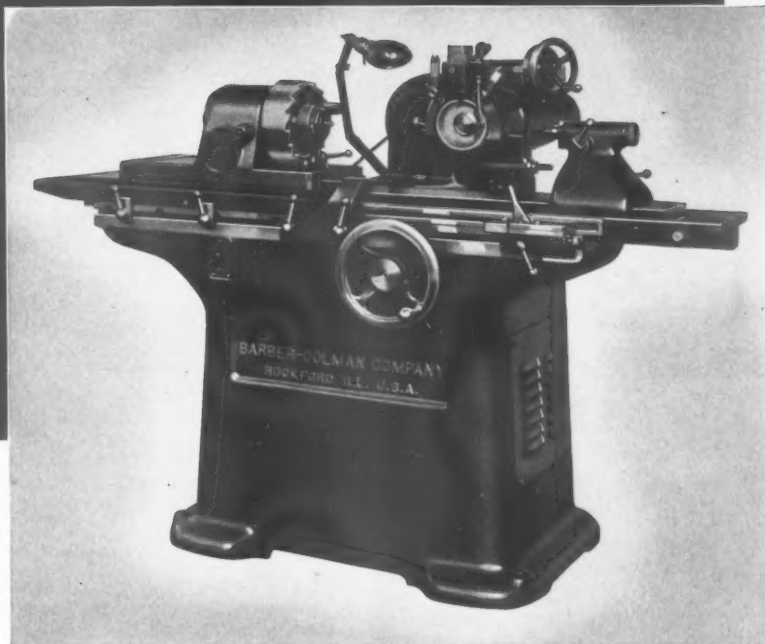
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Please address request for free sample and booklet to our general offices at 2727 SOUTH TROY STREET, CHICAGO



# The Barber-Colman

## Combination Sharpening Machine



The outstanding advantages in positive mechanical control of tool sharpening operations are now available to shops of all sizes and types . . . for sharpening all makes of reamers, hobs, and milling cutters . . . and all embodied in the Barber-Colman Combination Sharpening Machine. Following designs developed and proved successful in Barber-Colman Automatic Sharpening Machines, the spindle of our Combination Sharpening Machine runs at 3000 r.p.m. to 5000 r.p.m. in self-compensating bearings which automatically eliminate end-play. This, combined with precise machining and mounting of all related parts, provides positive diameter-control accurate within 0.0002". Cutting clearance, relief clearance, lead, profile, and radial faces on high spirals all are created with similar exactness. In addition to positive mechanical control and new high accuracy, the Combination

Sharpening Machine provides rapid easy set-up and quick change-over from job to job. Illustrated above, with typical applications shown at right, the Barber-Colman Combination Sharpening Machine is described in detail in Bulletin 1486 . . . write for a copy, today.

BARBER  
**B-C**  
COLMAN

PRODUCTS

MILLING CUTTERS,  
HOBS, HOBBING  
MACHINES, HOB  
SHARPENING MA-  
CHINES, REAMERS,  
REAMER SHARP-  
ENING MACHINES,  
SPECIAL TOOLS



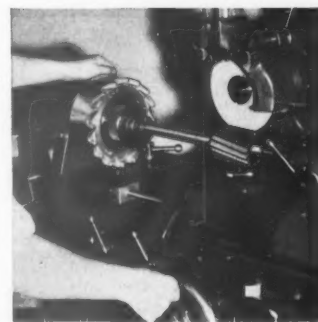
### for REAMERS

Handles any make, straight or taper, regular or irregular spacing. Controls diameters within 0.0002". Creates keen, durable, smooth-cutting edges; shapes and duplicates tooth or blade profiles precisely.



### for HOBS

Set-up for straight- or spiral-gashed hobs is simple. High-spiral dresser shapes wheel accurately to grind radial face on hobs having gash spirals up to 30°.



### for MILLING CUTTERS

Positive mechanical control of all steps in sharpening provided by this machine assures even distribution of load over all cutting edges, promotes increased tool-life and operating economy.

## BARBER-COLMAN COMPANY

General Offices and Plant ROCKFORD, ILLINOIS, U. S. A.

CLEVELAND, OHIO  
Barber-Colman Company  
3030 Euclid Avenue

DETROIT, MICHIGAN  
Hodges Machinery Company  
101 East Baltimore Avenue

MILWAUKEE, WISCONSIN  
Dumser & Schroeder  
610 West Michigan St.

The machine illustrated in this advertisement is now available for distribution only in the United States of America

Mention "The Tool Engineer" to advertisers

THE TOOL ENGINEER FOR NOVEMBER, 1938

29

## TOOLS, TAXES AND WAGES

(Continued from page 11)

enough so that everyone could make a profit, we could dispense with efficiency and improvement and invention.

### Another Silver Lining

Now let me turn to another dark cloud and try to find its silver lining. Take the 40 billion dollar national debt which we shall have piled up in the United States by next year.

Private industry has done a big job in cost reduction the last twenty years. You who can look back to the crude methods of 1918 will assent to this statement. But today our costs are ris-

ing, not because of any lack of diligence on the part of engineers and manufacturers, but because Government instead of reducing its costs has been increasing them.

Every time that Government costs and taxes are increased, it means an increased overhead to be met by our producing industries and their producers, means that much less for wages, profits, for private savings with which to buy the things that we need and want. And in the past five years our national debt has grown from 22 to 40 billion dollars.

Today our total tax burden is such that even small incomes pay a full 25 per cent in direct and indirect Federal, State and local taxes, means that the

average man works for Uncle Sam 3 months out of 12. But do not let this discourage you. I have shown you the dark side of the picture; now see the bright side.

An increase of National Debt, as during the past five years, may be likened to a flood on the Mississippi. When the Father of Waters gets to flood stage a legion hurries with sand bags to build up the dykes. If they work fast and hard and intelligently, they can get the best of the rising waters.

So with debt. Debt increase is a torrent which tears away our dykes of purchasing power. We can offset it if enough of us work hard and fast and intelligently enough to build up the increments of purchasing power faster than the debt flood tears away.

From its inception to the present, the automobile industry, through its own activities and those of suppliers and services, has created a total of 84 billion dollars in wages. Wages in private employment, which did not exist before, because the industry did not exist before 1900. New wages, new dollars grown in fields where no dollars had grown before, every one of these 84 billion dollars a new increment to national wealth. And the automobile industry is but one of many.

### Digging Out of Debt

Yes, a 40 billion dollar national debt is a tremendous load for any nation to carry. But thank God that we live in a nation where enterprise and initiative have made it possible for men of creative minds and hands to dig out of the fields of effort new wealth in sums that stagger the imagination. As long as we preserve, in this country, the spirit and the letter which permits and encourages the exercise of initiative, invention and freedom of enterprise we can offset national debts no matter how big, through the creation of new wealth. Discourage this spirit and letter and we will find it hard to diminish national debt however small it might be. Or to keep it from growing bigger.

That is something to think about very seriously in these days when efficiency and invention and improved machinery are under fire. For you men are the sort of men whose work creates new wealth. The larger the burden of debt and the greater economic difficulties that confront us, the more your work is needed.

Your work is just beginning. Today we are crossing the threshold into an era of technical development so great that no finite mind can encompass its possibilities. What they will be we do not know. What their effects upon the welfare of mankind may be we can scarcely imagine. All that we can do is to carry forward the torch of scientific knowledge and of skill which past generations have handed us. But never forget, as you do your daily work, that you are helping to forge the golden key, which will open the door to a better world for our children to live in.

# 1500 to 3200 STRONGER JOINTS AN HOUR

**SOLID RIVETS FED AND SET  
--- AUTOMATICALLY.**

**AN ENTIRELY FILLED HOLE  
INSURING RIGIDITY.**

**NO FLASHING --- PARTS ARE  
HELD TIGHTLY TOGETHER  
WHILE THEY ARE BEING  
RIVETED.**

"R" Machine sets up to 1/4" dia. x 7/8" long solid rivets at rates up to 1500 an hour or more depending on the job.

"BR" Machine sets up to 1/8" dia. x 1/2" long solid rivets at rates up to 3200 an hour. Write for Bulletins Numbers R-3 and BR-1.

**TOMKINS-JOHNSON**  
624 North Michigan  
JACKSON, MICHIGAN

**RIVITOR**

# "OK" for all METAL-CUTTING NEEDS



## ADDED SPEED — ECONOMY — FLEXIBILITY

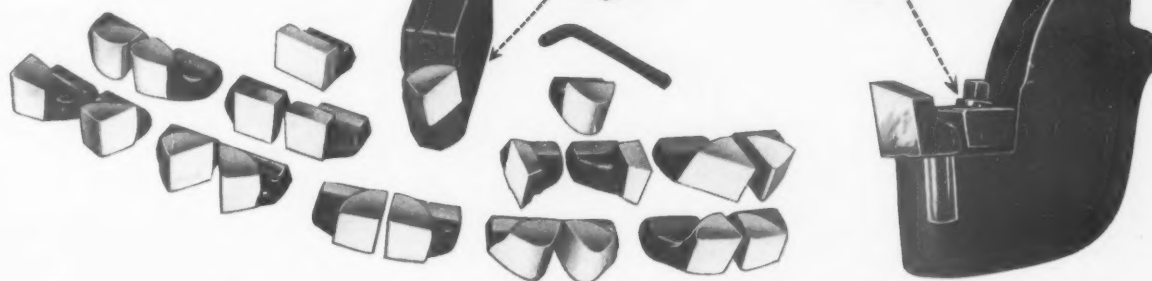
O K Inserted-Blade Metal Cutting Tools are ideal for the most exacting needs of the metal-cutting shop. They promote speed and economy and may be had in types for all metal cutting needs. In the multiple cutters (shown above) the blades are driven into serrated mating slots in the body, where they lock automatically and positively without wedges, pins or set-screws—yet are instantly adjustable in line of wear.

The Single-Point Tools embody various locking designs. Shown below are the Series 2000, in which the bits are held, like those of the milling cutters, in mated serrations; and the Series O-200, in which round shank bits are locked in a drop seat.

In all O K Tools, the bodies are fabricated of chrome nickel steel, forged and heat treated for maximum strength. The blades and bits are available in high-speed steel, Stellite and Super-Cobalt steel, and with special carbide tips.

O K Inserted-Blade Multiple Cutting Tools include boring heads, facing heads, reamers, counterbores, hollow mills, trepanning heads, end mills, various milling cutters, and special combination tools. The Single-Point Tools include those for lathe, planer, shaper, etc.

Complete Catalog  
and estimates  
on request



PRODUCTS OF THE OK TOOL CO., SHELTON, CONN., U.S.A.



INSERTED-BLADE METAL CUTTING  
**TOOL SYSTEM**



## MOLDING FROM THE PRACTICAL SIDE

(Continued from page 14)

poor results, such as flashing the articles, springs the molds, etc.

Venting of the mold can only be determined after the mold has been tested and found where this venting is required. This venting must be deep enough to allow gas and air to escape, and yet not deep enough to leave a fin or mark on the article. The depth also may only be determined from the material that is to be used.

Another essential of successful injection molding is high cavity luster. This luster must be put on a dead smooth surface, for if it is put on a rough surface, naturally the article will contain a high luster but poor smoothness.

Figure 4 shows an automatic unscrewing device set up and operating. This mold is electrically interlocked with the timing panel of the machine\*

so that the entire machine and mold function as one unit. This illustration will merely show to what extremes mold design can be brought so that today it may be said that there is almost no item, regardless of how complicated it may seem at first, that a mold cannot be designed to produce it successfully. In some cases it is necessary to change the design of the item slightly to improve the mold ability, but general satisfactory results may be obtained on practically any of these items, providing the molder and mold designer does not try to skimp and cut too many corners on the construction of the mold.

Naturally good equipment of the right kind is a necessity. Any molder who attempts to construct intricate molds with poor and obsolete equipment and unskilled men, will find his own folly. High speed precision milling machines are, naturally, the back bone of mold making. Figure 5 shows one of the most versatile of these precision ma-

find themselves particularly useful, other good equipment is essential, and a considerable amount of this equipment must be designed and built by the mold maker to meet his particular requirements.

The molding material to be used, naturally, must be for the particular re-

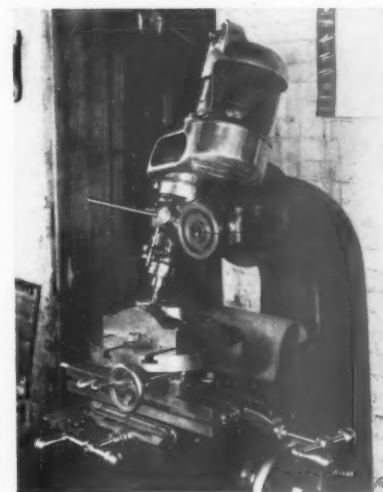


FIGURE 5

achines\* at work on two different injection molds. Although these machines require a medium grade of material and expect to use it for the entire line of molded items. The powder manufacturers are very cooperative on this point, and will do everything within their power to suit a material to the molder's particular needs, even to the extent of making special formulas.

The last requirement for good molding is skilled machine operators. No molder can expect good results and have young unskilled labor operating his machines. It is a different story if young mechanically minded men are broken in under the supervision of a good operator.

When a person looks back over the past 8 or 9 years from the infancy of injection molding to the present date, the strides that can be seen are almost breathtaking, and undoubtedly the next 5 years will bring even more breathtaking results.

\* No. 2-V Reed Prentice used.

## METHODS AND TOOL DESIGN

(Continued from page 13)

who devise the methods and tools. We could go on indefinitely stating the responsibilities of the men whose continued efforts are put forth to produce more and better products at lower cost. The entire organization must have as a constant objective the improvement of design, methods, layout, tools and reduction of losses. Remember there is always a better and less costly way to do a job. So regardless of the current degree of perfection, be assured there is room for improvement.

## WHY HASKINS DELIVERS TOP TAPPING PRODUCTION CONSTANT PRECISION LIMITS ARE OBTAINED IT PAYS TO HAVE HASKINS FROM THE START



**REASON ONE**—The precision tools, equipment and workmanship used to build speed and endurance into the Haskins Tapper. The constant modernization of Haskins' own plant (in which 95% of all Tapper parts are made) with the newest in efficiency methods and precision equipment. Only precision maintained shop equipment can produce precision tapping machines.

**REASON TWO**—The exclusive features of design, engineering and construction which distinguish the finished Haskins Tapper. Haskins pioneered such features as foot pedal control, rigid no-float spindle, instantaneous reversal of tap spindle. These mean quicker handling of parts, reduced operator fatigue, closer tolerance.



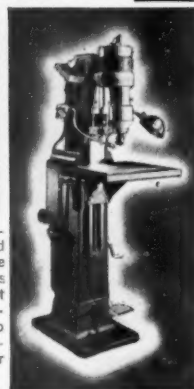
**REASON THREE**—Haskins Engineering Service—a vital part of the exclusive Haskins Method. Haskins Engineers regularly work out new fixture designs that simplify and speed up troublesome jobs.



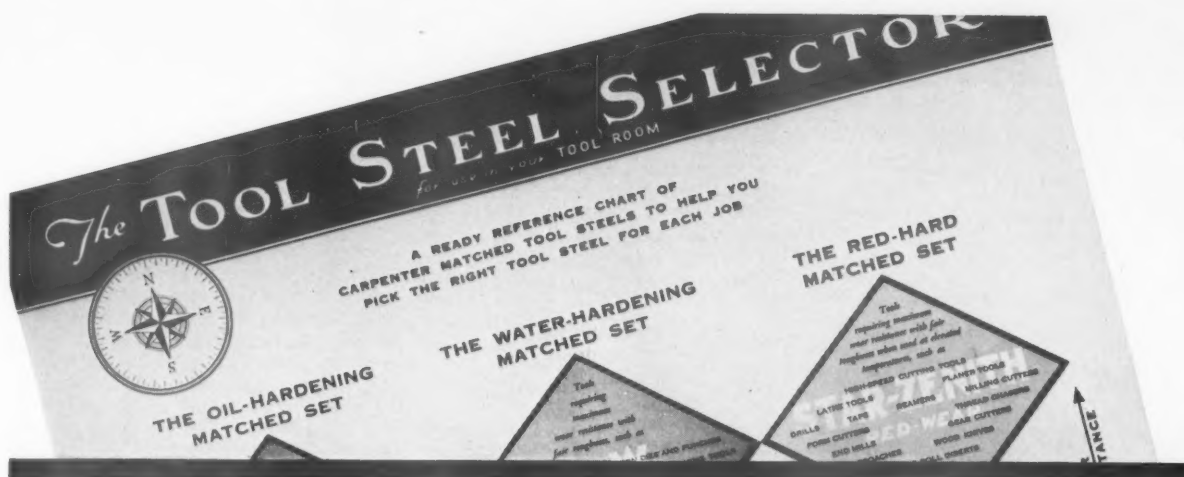
**REASON FOUR**—Each Haskins field representative is a tapping authority. A trained tapping specialist able and willing to solve difficult problems. Haskins Service begins where most service ends—with the sale!

Given here are some of the reasons why The Haskins Method is more than a machine—is, in fact, a new, more effective and more economical approach to the tapping problem. A free booklet—"Precision Tapping at High Speed"—completely describes this improved method and illustrates it in action. Write for your copy. R. G. Haskins Company, 2756 W. Flournoy Street, Chicago.

**HASKINS** PRECISION  
Tapping  
Equipment



**REASON FIVE**—The actual performance records chalked up by Haskins Tappers on every type of tapping job. The one illustrated—tapping two blind holes in a die casting—has been greatly simplified by the use of a Haskins designed swing fixture that minimizes handling operations and eliminates the need for clamps.



## SPEED THE JOB INTO PRODUCTION

### *With this Modern Method for Selecting Tool Steel*

**Y**OUR aim is to get the job from your board through the tool room and into production as *quickly* and *safely* as possible.

To help you accomplish this, the Carpenter Steel Company has developed a systematic method for selecting the right kind of tool steel for each and every job. It not only saves time, but avoids trouble in hardening and in service—helps you to get the kind of performance you planned—and holds down tool costs.

If your Tool Room has not yet swung into line with Carpenter's simplified method, find out how much time and money can be saved by adopting it for your plant.

Write today for the Wall Chart Tool Steel Selector—a ready reference guide to the new method. Along with the large size wall chart, we will send you a copy of the Tool Steel Manual—50 pages of valuable information and data that helps you put the idea to work. This is the kind of information formerly available only from the "mill expert"—now put in black and white by the Carpenter Steel Company. Your request for these two valuable aids does not oblige you in any way.

## THE CARPENTER STEEL COMPANY, READING, PA.

MAKERS OF FINE TOOL STEELS SINCE 1889



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MATCHED  
TOOL STEELS**

**FREE!**

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THE CARPENTER STEEL CO.  
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Please send me free, and without obligation, a copy of your large Wall Chart Tool Steel Selector and the 50-page Tool Steel Manual

NAME

FIRM

ADDRESS

(Firm name must be given)

TITLE



## INDUSTRIAL THREAD GAGES

(Continued from page 15)

fit for a tapped hole they usually have to consider cost as much as they do quality. Therefore, sometimes where a class 3 fit is indicated, a class 2 fit can be used without sacrificing quality. To illustrate this, suppose a  $\frac{1}{4}$ "-20 N.C. hole is being tapped. A class 3 fit has a limit of .0026 between Go and No Go Gages, and out of this the manufacturer of the gages has a working tolerance of .0003 on each gage, leaving only .002 to work with. If the tap being used is made .001 over the basic size, then

only .001 is left between the tapped hole and the No Go Gage size. This is a very small amount considering also that the tap will no doubt cut larger than itself, reducing this allowance still further. Taking a class 2 fit in this same size, this fit has a limit of .0036 between gages and all things being equal would leave a limit of less than .002 between the tapped hole and the No Go Gage.

In a previous paragraph we mentioned that it was not good practice to allow a gage to be worn beyond a certain point of economy, and it is well to note that one of the most vital factors

in judging the value of a thread gage is its wear-resisting qualities. In an effort to overcome this problem of wear, gage manufacturers have been experimenting for years with various alloy metals and tool steels with special heat treatments.

High speed steel of 18% tungsten (18-4-1 analysis) is extensively used for ground thread plug gages, and gages made of this material stand up very well under the severe usage given them in the average shop.

Some manufacturers prefer to have their gages chromium plated. This gives a surface that offers good resistance to wear, however, this plating is not an easy process, and if improperly applied the chromium plated surface of the threads will chip and peel, resulting in a shorter life for the gage.

Among the special materials in use for thread gaging, one particularly has given some remarkable results. This material is a cast alloy\* containing in its analysis tungsten, cobalt, and chromium. Thread plug gages made of Crobalt in test runs have been used to gage many thousands more holes than gages made from regular steels, and at the end of the run the gages showed no appreciable signs of wear.

Many other materials are in use, but space does not permit a discussion of these at this time.

\*Known as Crobalt.

## CHAPTER DOINGS

(Continued from page 18)

**Detroit.** The Executive Board met Oct. 5th at A.S.T.E. Headquarters, Mr. Wagner presiding and 16 members present, Directors and Committee workers. Final details of Semi-Annual were disposed of and future plans outlined. A short meeting, adjourned before midnight. Detroit Chapter cancelled its October meeting, so many members are going to Pittsburgh. I hear that Ivar G. Eklund, for the past several years Chief Engineer at Midland Steel Products, Detroit plant, has resigned to become General Mgr. of A/B (Corp.) J. C. Ljungman, Malmo, Sweden, said to be one of the most modern plants in Europe. He sailed Oct. 28th with his wife and little son. We wish this Tool Engineer success and happiness in his native Sweden. Skoall

## PRODUCTION PERSPECTIVES

(Continued from page 16)

Co. in Meriden and other communities were flooded, some with severe loss, but operations have been resumed and production is now at a good level in anticipation of heavy Christmas demand. The machine shop of E. Horton & Sons Mfg. Co. in Windsor Locks was damaged, while the Collins Co., Collinsville, suffered its heaviest loss since 1878. The Collins Co., however, benefited strongly from an unprecedented demand for axes, which it manufactures. The Bridgeport Brass Co., Bridgeport, suspended production for a short time when flood waters wrought havoc.

**The "HUSKY"**

**FOR TOUGH JOBS IN TIGHT SPOTS**

The automotive industry is almost unanimously in accord on one point... the use of Dumore No. 9 Hand Grinders in their tool and die rooms. That's because this versatile tool had the stamina to stand the rigors of rough, heavy work... yet compact and handy enough to get into cramped quarters. The No. 9 is powered by a  $\frac{1}{5}$  h.p. Dumore Universal motor, with built-in air filter, and is available with side or end handle. Check these Dumore features against any other hand grinder before you buy: Armature dynamically balanced to eliminate vibration... windings pre-expanded, then sealed to prevent centrifugal "breathing"... commutator ground concentric with bearings for longer brush life... armature leads swaged to the motor for 100% contact (by special Dumore process)... motor run-in to seat brushes... and the tool inspected 5 times in manufacture. Dumore Distributors will gladly demonstrate the No. 9 or any other Dumore tool. Write for facts today.

**THE DUMORE CO., Dept. 228-L RACINE, WISCONSIN**

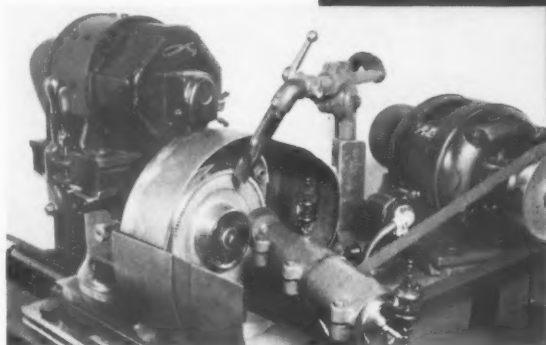
**DUMORE**

**PRECISION GRINDERS**



**Right:** 12x36" Type C Norton Multipurpose.

**Below:** Grinding the hub on an aircraft engine cam where only a small wheel can be used. The internal spindle on a 16" Multipurpose solves a difficult job.



*Modern Machine Tools when  
Busy Earn Profits -- and*  
**NORTON MULTIPURPOSE  
GRINDERS** are easily kept busy

ONE of these universals in your shop may grind all the work now done on several more specialized machines and show a real saving in floor space, investment and depreciation.

Here is a complete line of grinders fully universal in construction but with the weight, rigidity and power for rapid and accurate production in manufacturing departments as well as tool rooms.

Makers of special machinery in small lots, experimental and model machines, as well as general jobbing and repair shops, will find the NORTON MULTIPURPOSE a valuable profit maker.

**NORTON COMPANY, WORCESTER, MASS.**

New York Chicago Detroit Cleveland Hartford London

**NORTON GRINDERS**

## New Literature

of Interest to the Tool Engineer

Pratt & Whitney, Division Niles-Bement-Pond Company, Hartford, Conn., have recently issued a new circular No. 442 on the Supermicrometer. Although Pratt & Whitney has built the Supermicrometer for many years this circular shows the new model with its completely revised and basically different pressure tailstock. The circular is well illustrated and gives a full description of this instrument which is designed to bridge the gap between the hand micrometer and the more expensive measuring machine.

Landis Tool Company, Waynesboro, Pa., pictures and describes thoroughly the new Landis No. 2 Race-A-Way Grinder in a catalog designated as No. RW-38, free on request.

A new illustrated Tap Data booklet has been prepared by Winter Brothers Company, Wrentham, Mass. This booklet places in the hands of the tap user a variety of useful information in convenient form. It is believed that the material contained therein will fill a very real need, since the statements made in it are cumulative experience of over a third of a century of practical tapping and tap making. Copies may be procured free on request by writing to the Wrentham office. Mention "The Tool Engineer."

A new Sundstrand Number 0 Rigidmil in

both Hydraulic feed and Hand feed models is described in an illustrated bulletin No. 382, just issued by the Sundstrand Machine Tool Company, Rockford, Ill.

The vast scope of "ready made" standardized bearings, instantly available to all factors engaged in the production and maintenance of all kinds of machinery and electric motors, is graphically revealed in the new 1939 catalog just issued by The Bunting Brass & Bronze Company of Toledo, Ohio. The book lists hundreds of different sizes of completely machined and finished Standardized Bronze Bearings which meet practically all usual applications, and bronze bearings for all makes of electric motors from 1/50 h.p. to 100 h.p. The new Bunting Precision Bronze Cored and Solid Bars of bronze bearing metal, lead base and tin base Babbitt, and other special products of the company are comprehensively represented. The book also contains much valuable data on oil grooving, graphiting and special operations in bearing manufacture. The company will gladly send a copy postpaid on request.

A new piece of literature entitled "Metal Stamping in Small Lots," has been prepared and is ready for distribution by Dayton-Rogers Mfg. Co., Minneapolis, Minn. This booklet explains how stampings in small quantities for which die costs would ordinarily be prohibitive can be made at a surprisingly low cost.

The Black & Decker Mfg. Co., Towson, Maryland describes a new drill—the Holgun—in a recent bulletin. This bulletin gives the structural features of the Holgun and contains specifications and labeled illustrations which fully describe it.

Procurier Safety Chuck Company, 18 So. Clinton Street, Chicago, Ill., has prepared a folder, Bulletin No. 38, which illustrates and describes their new "A" Series Universal Tapping Machine. This machine is designed for those smaller size tapping jobs most efficiently accommodated by a high speed, flexible, precision tapping machine.

Cincinnati Milling Machines & Cincinnati Grinders, Inc., Cincinnati, Ohio, now have available their new circular G-422 describing "Willey's Tungsten Carbide Work Support Blades for Cincinnati Nos. 2, 3 and 4 Centerless Grinding Machines." When writing for your copy mention "The Tool Engineer."

"Norton Wheels for American Thread Grinding Machines" and "Roll Grinding" are new or revised booklets recently issued by the Norton Company, Worcester, Mass. The Norton booklet on "Disc Grinding" has no major revisions except the necessary changes in the table of recommendation, however, drawings have been included on each illustrated page to more clearly indicate the method of mounting each type. The first half of the book "The Norton Pulpstone" has been completely rewritten, bringing the descriptive matter up to date. Copies of each of these publications are available free upon request, mention "The Tool Engineer."

A complete new illustrated bulletin giving full details of the new Galland-Henning Non-Adjustable Type of Cushioned Air Cylinders as well as the Adjustable Type is now ready for distribution to manufacturing executives. Write the Galland-Henning Manufacturing Company, So. 31st Street, Milwaukee, Wis., mentioning "The Tool Engineer."

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**Your check will always show them parallel**

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Our whole operation is keyed to making one die set exactly match the next one of the same size, or the next thousand.

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*It will be good business for you both*

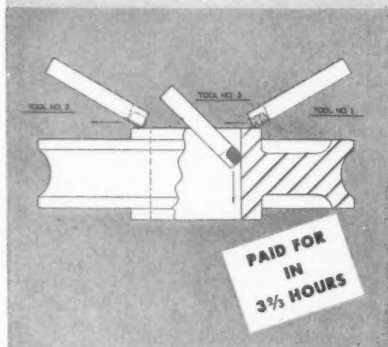
DANLY MACHINE SPECIALTIES, Inc., 2112 So. 52nd Ave., Chicago, Ill.

# DANLY DIE SETS and DIE MAKERS' SUPPLIES

*Their Dependable Quality Means Lower Cost Stampings*

# CARBOLOY TOOLS *Pay for Themselves*

## FAST!



**\$21.73 TOOL COST**—Cost includes 2 spare tools and special grinding wheel.



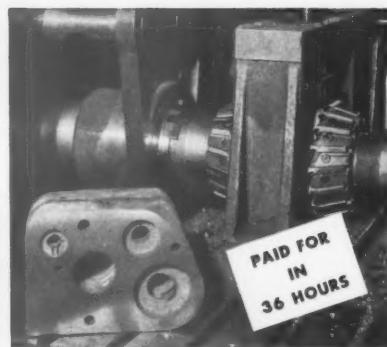
**\$40.14 TOOL COST**—5 tools for boring facing, and forming silicon-aluminum motor housing.



**\$30.39 TOOL COST**—7 tools for turning, facing, chamfering cast iron carburetor part.



**\$6.50 TOOL COST**—1 tool for finish facing aluminum aviation motor part.



**\$276.96 TOOL COST**—Two 7" cutters, for milling cast iron valve bodies.



The unusual savings made by Carboly tools quickly absorb the original price you pay for them. The illustrations above show typical cases. . . \$276.96 worth of Carboly cutters paid for themselves in 36 hours . . . five tools costing \$40.14 saved their own cost in 18 hours . . . a seven tool set-up saved enough to "pay-

out" in 13 1/3 hours . . . and so it goes . . .

Nor are these hand-picked applications. They're ordinary, everyday run-of-mine operations such as you might do in your own plant.

In each case the money spent for Carboly tools came back fast and savings started rolling in.

## CARBOLOY COMPANY, INC., DETROIT, MICH.

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We'd like to know how fast Carboly Tools will pay for themselves on our jobs.

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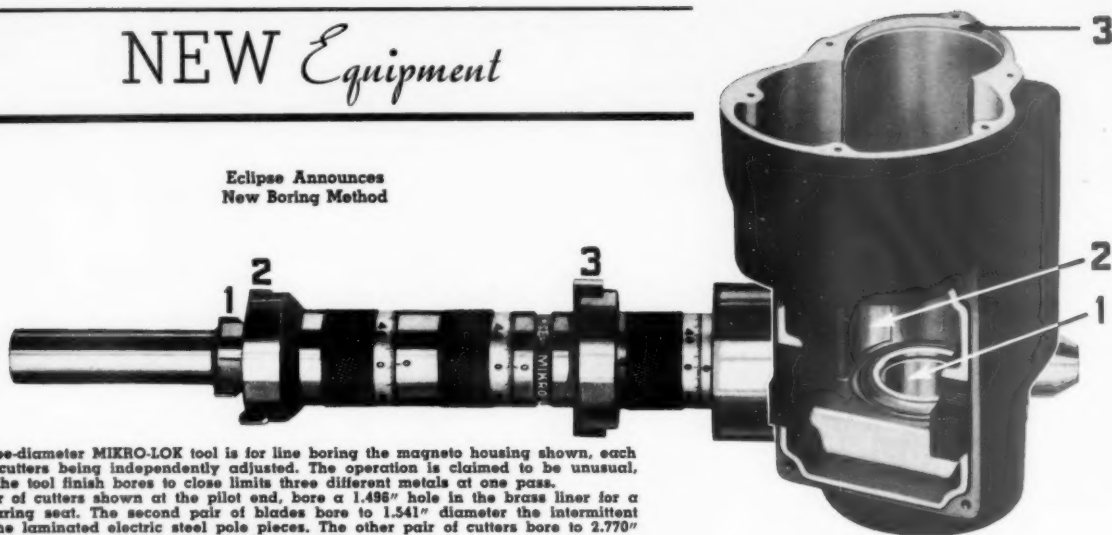
# CARBOLOY

REG. U. S. PAT. OFF.

## CEMENTED CARBIDE TOOLS

# NEW Equipment

Eclipse Announces  
New Boring Method



This three-diameter MIKRO-LOK tool is for line boring the magnet housing shown, each pair of cutters being independently adjusted. The operation is claimed to be unusual, in that the tool finish bores to close limits three different metals at one pass. The pair of cutters shown at the pilot end, bore a 1.498" hole in the brass liner for a ball bearing seat. The second pair of blades bore to 1.541" diameter the intermittent cut in the laminated electric steel pole pieces. The other pair of cutters bore to 2.770" diameter the end cap seat in the aluminum housing. The bar is piloted both above and below the work and the cutters may be either sharpened in the bar or removed from the bar for sharpening. It is claimed that the cutters may be speedily set and dependably maintained to blueprint sizes.

THE advent of the jig boring machine, and high speed production boring machines, for boring holes to very close tolerances—together with the development of Cemented Carbides for removing stock at very high speeds, has necessitated comparable advancement in hole-finishing methods. Boring bars and other hole-finishing tools are now required having adequate rigidity and maximum cutting ability, combined with facilities for quick, accurate and simple adjustment to precision dimensions.

Several different standardized constructions in boring bars are available. Some are advantageous for tool room work, while others are preferable for production jobs. Most of these were developed prior to the introduction of Tungsten Carbides and some later were adapted to the use of Carbides.

Modern progress in the manufacturing industry, in which special machine tools are rapidly surpassing standard machine tools in development and demand, has opened new avenues for advancement of cutting tool designs and as a result many former tools are no longer adequate for present day tool room and production shop requirements.

Trained in some of the country's leading shops manufacturing quality cutting tools, W. K. Young, Chairman of Standards Committee of Rockford Chapter A.S.T.E. and now Manager of the Boring Tool Division of the Eclipse Counterbore Company of Detroit, long ago recognized the need for distinct advancement in hole finishing tools to cope with the increasing demands of machine tool builders, and over five years ago began extensive research into this boring tool field.

Concentrating his efforts toward perfecting a construction which would prove both extremely accurate in performance and rapid in changing from size to size resulted in a dependable construction involving micrometer adjustment and self-locking features of advanced and unique designs, having a wide range of application in the machine tool art of the present period.

This standardized construction, known as "MIKRO-LOK," has a sturdy, well-balanced adjusting mechanism which is entirely enclosed, preventing foreign accumulation since it is free from usual outward obstructions. The rigid construction protects its finely accurate adjustability and, being simplified,

lends itself to many special arrangements of production boring operations.

Preferring ultimate perfection in design and construction through actual performance tests and service records, to immediate sales promotion, Mr. Young withheld publicity and broad offering of these developments. However, hundreds of his applications are in use throughout this country and abroad having been supplied as hole-finishing tools on special production machines built principally in the Rockford area during the past five years.

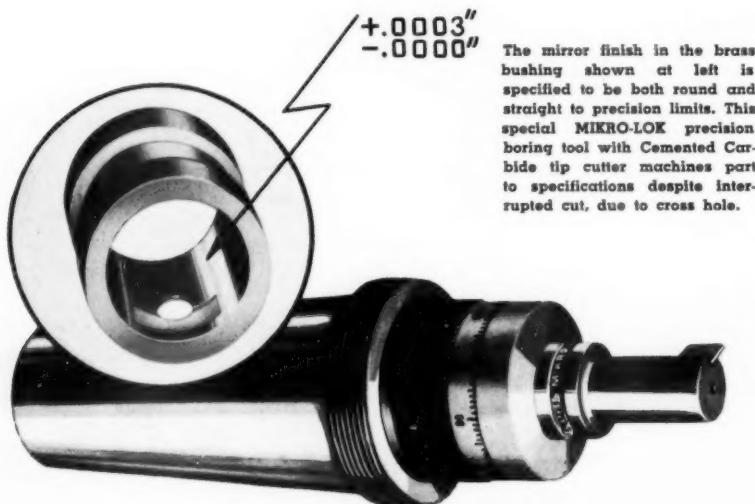
Speed in setting boring bar cutters to hole size, or in resetting from one size to another is vital in reducing production time on most boring operations. "MIKRO-LOK" simplicity assures these changes with precision, accuracy and accomplishes in seconds what formerly required minutes, in fact operators quickly learn that its dependability is comparable to that of the finest standardized micrometers.

The Eclipse Counterbore Company, manufacturers of production tools, were fortunate in acquiring the services of Mr. Young, together with his complete line of "MIKRO-LOK" precision boring, jig boring, reaming, undercutting, feed-out type and reaming tools which are now being manufactured in their modern factory in Detroit.

A complete stock of all practical standard sizes will be carried and special applications to suit individual production requirements are engineered, manufactured and serviced through the Detroit organization.

The "MIKRO-LOK" line includes jig boring tools available in sizes for boring holes from 3/4" diameter to 4" and high-speed precision boring tools (for "diamond boring" machines) for hole sizes as small as 1/8" in diameter in increments of .00025"; two-bladed precision end-boring tools, also floating blade boring tools for accurate hole finishing where floating reamers are being used adjustable in increments of .0005"; automatic feed-out type tools for recessing and undercutting otherwise inaccessible surfaces. Bars having piloting sections, both above and below the work, combining two or more cutting blades in tandem or independently distributed on the bar for multiple diameter line boring, and numerous other wide range production and tool room applications offer new economies to industry.

(Continued on page 40)



The mirror finish in the brass bushing shown at left is specified to be both round and straight to precision limits. This special MIKRO-LOK precision boring tool with Cemented Carbide tip cutter machines part to specifications despite interrupted cut, due to cross hole.



# DISCOVERED - A NEW WAY To Cut Costs

You would be amazed at the number of manufacturing plants in this country using Delta Drill Presses that list under \$50! Their names read like the Blue Book of American Industry. Other Delta tools at corresponding low prices are doing things in both metal and woodworking that were previously thought impossible. Just consider these factors: **Low first cost**—because Delta light power tools are made in quantities on the finest high-production equipment; **Economical operation**—because they are lighter and require less power; **Low maintenance cost**—because of sealed-for-life bearings and the low cost of replacement parts; **Flexibility**—special units can be made up from Delta tools at a considerable saving; **Portability**—Delta tools can be moved instantly where they are most needed; **Reduced labor cost**—because they can be used for auxiliary operations to fill in "waiting time" that would be otherwise wasted.



If you want to learn how to cut your production costs without a heavy investment—if you want to learn how other manufacturers, large and small, are stealing a march on their competitors by using light power tools—send for the 1939 Delta catalog TODAY! It will give you facts, figures, specifications and performance records that will open up your eyes!

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Pittsburgh—J. W. Mull, Jr.  
Toledo—J. W. Mull, Jr.  
Philadelphia, Pa.—Morgan Tool  
& Equipment Co.

## NEW EQUIPMENT

(Continued from page 38)

### The Landis No. 2 Race-A-Way Grinder

The new Landis No. 2 Race-A-Way Grinder is a revolutionary type of machine tool, is unlike any other previously offered grinders of a general type from the standpoint of operation, design and appearance. It may be had either tooled to internal grind the raceways of outer races or to external grind the raceways of inner races. The internal machine has the capacity to handle the smaller sizes up to and including the 212, 311 and 409 groups. Sizes up to and including the 218, 316 and 414 groups may be handled by the external machine. They may be utilized for both single and double row races.

To insure constantly maintained rapid production the entire grinding cycle is automatic

once it has been set in motion. It is only necessary for the operator to load the work and depress the cycle start button. From that point on the race is completely ground to size and all the machine movements stopped without further attention. One man may with ease operate two machines. An innovation, it is claimed, is the provision which has been made for what might be termed form grinding each raceway just at the end of the cut, that is, during the sparking out period. When the work is practically to size, feeding in movement stops and work head oscillation also stops with the work head centered. The wheel sparks out without any oscillating motion whatsoever, and a raceway with superior finish is produced. As a consequence of this method of handling, it is unnecessary to form grind races after they have been ground on the Race-A-Way in order to secure the degree of finish required for precision

types of bearings. The movements of the machine are controlled by electric push buttons and selector switches, which means that the machine is largely electrically operated, although certain hydraulic movements are also employed. A large master safety button when depressed will stop every machine movement instantaneously. Basically the machine is the same whether tooled for internal or external grinding. The main differences are in the design of the sizing device and work holding chuck and the size of the grinding wheel spindle and the wheel.

Automatic sizing is accomplished by means of the Landis-Solex sizing device in combination with an electric timing device. Oscillating movement of the work head is mechanically actuated through the medium of an adjustable crank arrangement.

The No. 2 Race-A-Way Grinder is a real departure, it is claimed, from conventional grinding machine design when considered from the viewpoint of its appearance. The outside of the bed is completely devoid of attachments, appendages, control boxes and all like items. Separate compartments in the bed house the various mechanisms, the electric control panel and the sizing device con-



**LARGE SIZE  
Up to 1 Inch**

## NEW LUFKIN RADIUS GAGES

**With Radii from 9-16" to 1" by 16ths**

To meet the demand for radius gages with radii larger than  $\frac{1}{2}$ ", this new large size Lufkin set is now offered with radii up to 1". Like all Lufkin Radius Gages, each blade is a separate unit, prominently marked with its individual radius, and carrying five applications of the internal and external forms. A sturdy leatherette folder is furnished with every set.

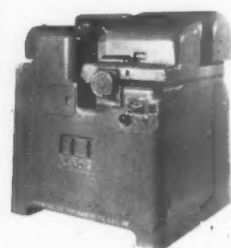
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**THE LUFKIN RULE CO.**  
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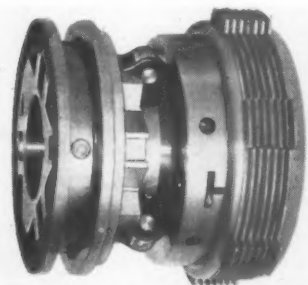
**TAPES — RULES — PRECISION TOOLS**



trols. Concealed door hinges contribute to the appearance of the machine which because of its smooth surface may easily be kept clean. The guards covering the top mechanisms blend in with the shape of the bed in a most pleasing manner. All motors and controls are considered a part of standard equipment and are included in the price of the machine. An important safety feature is the fact that when the compartment doors covering the electric controls are opened the entire electric circuit is killed. Net weight of the machine is approximately 4800 pounds. Floor space required is 47" by 52". All electric motors are of the constant speed type. The work drive motor is  $\frac{1}{2}$  H.P., the wheel drive motor is 3 H.P. on the internal machine and a 5 H.P. on the external machine, and the oscillating drive motor is  $\frac{1}{2}$  H.P.

### Twin Disc Clutch Company Announces New Model

A new model of Multiple Disc type Clutches designed for machine tool and other



installations where space is limited has recently been put on the market by Twin Disc

(Continued on page 45)

CONTINUOUS OPERATION  
DOESN'T STRAIN THE

## MICRO

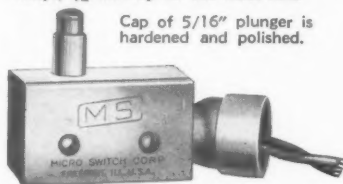
1/4 Inch Overtravel

METAL CLAD

## SWITCH

Especially suited for exacting service on automatic machinery requiring direct contact with high speed actuators. Adaptable for closed, open or double-throw circuits. Millions of operations. Sealed in a metal housing. Threaded for right or left hand angle mounting 1/2" or 3/8" straight fitting. Overall dimensions 2 1/8" high, 1" wide, 3 1/4" long. Write for specifications and recommendations covering overtravel switch applications.

- 1—Movement differential under .0005"
- 2—Operating pressure about 8 1/2 oz.
- 3—Overtravel of actuator plunger beyond operating point 1/4"
- 4—Heater loads 1200 watts up to 600 volts A.C. Also inductive loads, solenoids, and relays, 1/2 H.P. up to 460 volts A.C.



Cap of 5/16" plunger is hardened and polished.

MICRO **MS** SWITCH  
CORPORATION

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BY THE  
BEARING-IZING  
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ACCURATE -  
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SEND DRAWINGS FOR  
RECOMMENDATIONS—NO  
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HOLE ENGINEERING SERVICE  
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DETROIT, MICH.

# JARVIS

## SENSITIVE and HIGH SPEED TAPPERS

### 9 EXCLUSIVE FEATURES

1. All spindles running in standard ball bearings.

2. All revolving parts lubricated by oil bath.

3. Mechanical labyrinth oil seal to keep oil inside tapper.

4. Overflow plug makes oiling easy and over-oiling impossible.

5. All parts are interchangeable including actual frictions. The reverse friction is larger and the reverse speed twice that of the tapping speed.

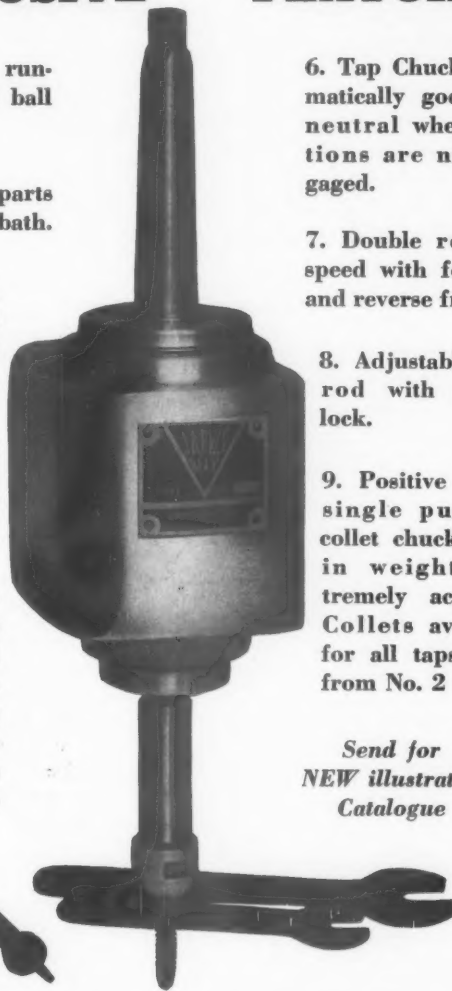
6. Tap Chuck automatically goes into neutral when frictions are not engaged.

7. Double reverse speed with forward and reverse friction.

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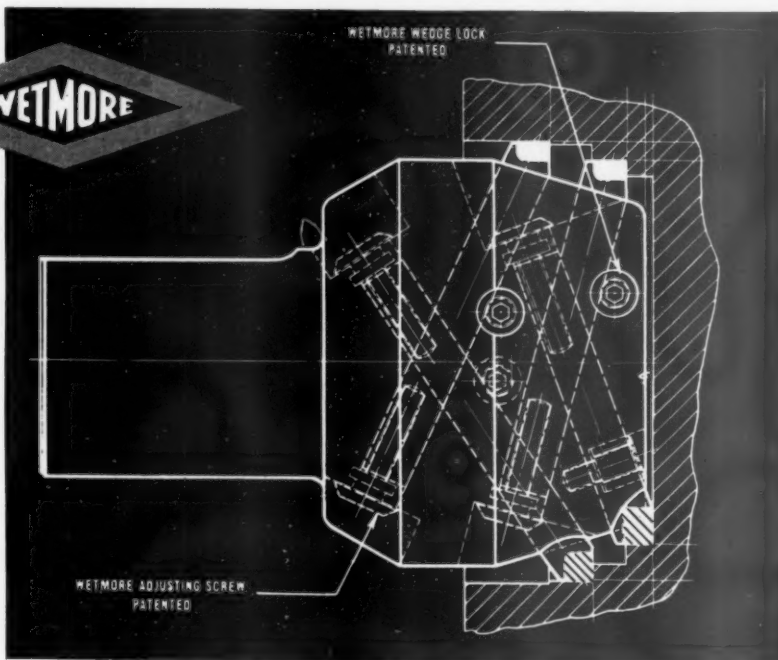
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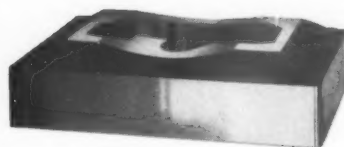
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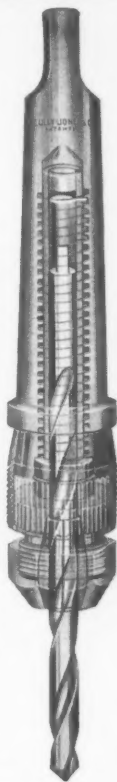
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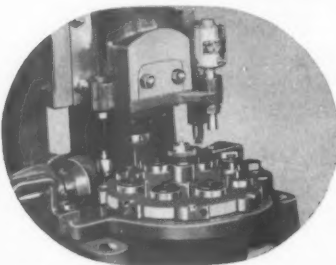
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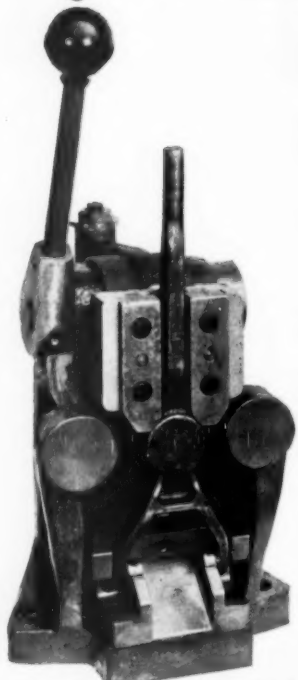


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(Continued from page 40)

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### "LOGAN" Control Valves

Logansport Machine, Incorporated, Logansport, Indiana has developed new "Logan" Remote Air operating Systems to simplify the control of air operated equipment. They make possible remote control for air devices, permit operation from conveniently located operating stations, and are suitable for practically any kind of manual, semi-automatic, automatic, inter-locking or sequence control of one or more cylinders.

Master control valves are installed close to the cylinder resulting in short pipe connections and a minimum of friction losses. They are operated by either direct connected bleeder valves, pressure operated bleeders, solenoid bleeders, or a combination of these types. Operating stations are placed in any convenient location, within easy reach of the operator.

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LOGAN CONTROL VALVE

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"Logan" bleeder valves and three-way valves are available for hand, foot, cam, pressure, or solenoid operation. They can be furnished for either base or side mounting, right and left hand.

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### New Weld-Built Hydraulic Lift Truck

A new Hydraulic Lift Truck has recently been announced by West Bend Equipment Corporation, West Bend, Wisconsin.

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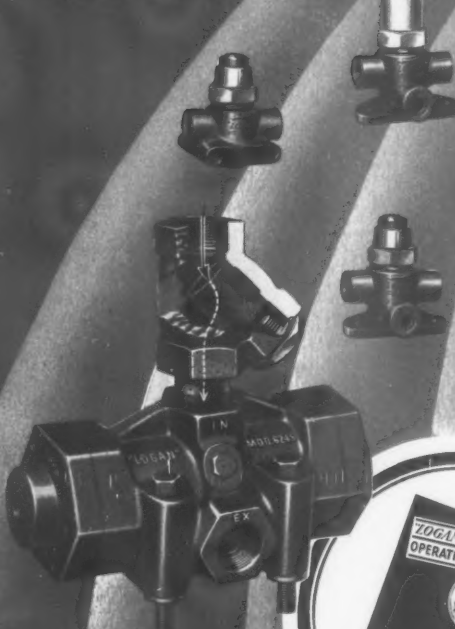


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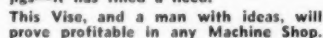
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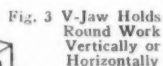
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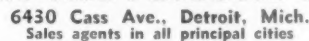


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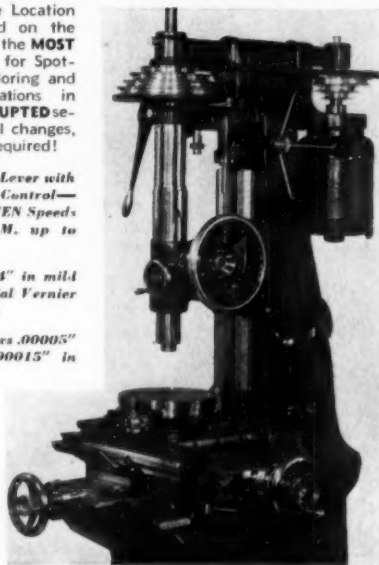
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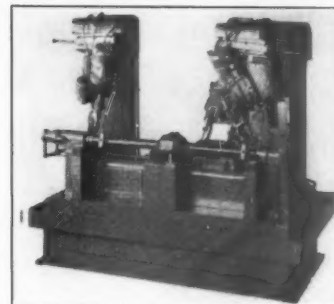
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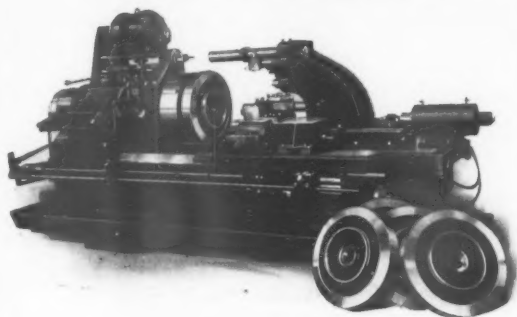
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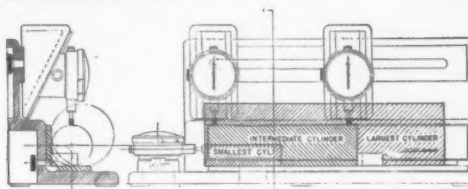


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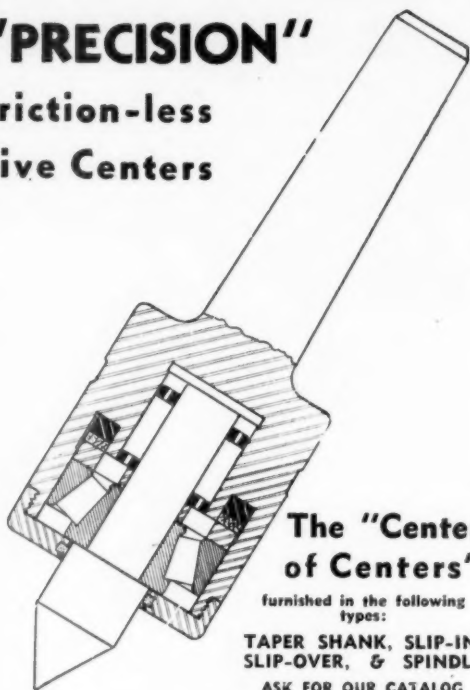
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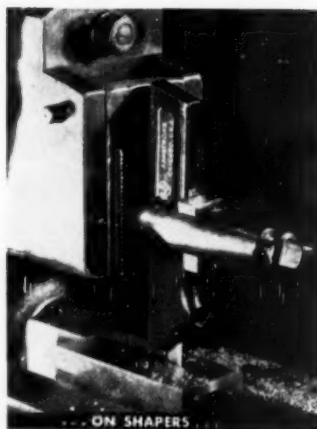
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